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THE MITRIDAE OF THE WORLD

Part I. The Subfamily Mitrinae

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Worldwide Mitridae

The gastropod family Mitridae, popularly known as mitre¹ shells, is a member of the rachi-glossate group of Neogastropoda, and, with the closely related families Volutomitridae and Volutidae, belongs to the superfamily Volutacea. Species live in tropical and temperate waters in all major geographical provinces, but species concentration is highest in tropical and subtropical regions, particularly the Indo-Pacific. The majority of species live in shallow water of the intertidal zone, where they are found buried in clean, muddy or silty coral sand, or beneath rocks and coral and in crevices of coral reefs. Only a few species live beyond the littoral zone, at depths not exceeding 1,465 metres. Known since Upper Cretaceous times, when Mitridae presumably evolved from a fascioliariid ancestor, more species are living today than have been recorded during the family's long geologic history. Although 2,630 names have been proposed for species of Mitridae, only 840 names are considered to be valid. Recent species number 375, and fossil species 461 (this figure appears to be inflated due to the inclusion of probable synonyms). In part 1, 123 Recent and 79 fossil species belonging to 11 generic groups are described and illustrated. In addition, 168 European Tertiary species are listed. The subfamilies Imbricariinae and Cylindromitridinae will be dealt with in part 2.

Family Characters

Mitridae are characterized by fusiform, elongate-ovate or cylindrical shells which have

convex or angulate whorls, usually a narrow aperture, from 3 to 11 folds on the columella and a distinct siphonal notch. The shell-surface of mitre shells is rarely smooth and bears a sculpture consisting of grooves, striae, pits, folds, ribs or granulations. In 2 fossil genera the columella has only 1 or 2 folds, while in the Recent deep water South African genus *Charitodoron* Tomlin, the columella is edentulous. Although a rudimentary operculum is present in the veliger stage, this is absorbed during growth and disappears in the early juvenile stage. Mitridae are occasionally confused with Turridae and Columbelloidae, but they resemble species of Volutomitridae most closely. The following are the salient taxonomic differences between the two families:

Mitridae

- A. Animal without an operculum
- B. Protoconch conoidal and multispiral or slightly papillose and paucispiral
- C. First posterior columellar fold larger and longer than second fold, folds close-set
- D. Siphonal canal notched
- E. Radula with rectangular or bow-shaped, multicuspid rachidians

Volutomitridae

- A. Animal sometimes with an operculum
- B. Protoconch mammillate and paucispiral
- C. First posterior fold shorter and smaller than second fold, folds wide-spaced
- D. Siphonal canal unnotched and spout-shaped
- E. Radula with wishbone-shaped, unicuspid rachidians

¹The American spelling is *miter*.

The protoconch in Mitridae is conoidal and multispiral, but in some vexilline genera, i.e. *Austromitra*, *Pusia* and *Thala*, the protoconch is slightly papillose and paucispiral (Plate 248).

The animal has a moderate or large foot which is bluntly truncated anteriorly and pointedly rounded posteriorly, and is particularly long in sand-dwelling species, in which it may extend beyond the apex of the shell. The mantle is thin,

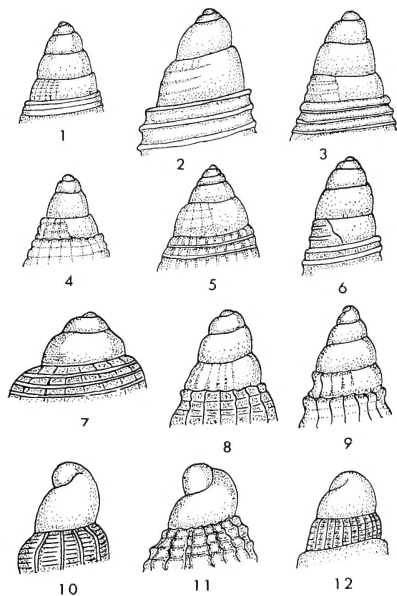


Plate 248. Types of protoconchs in Mitridae. Conoidal-multispiral (Figs. 1-9) Papillose-paucispiral (Figs. 10-12).

Fig. 1. *Mitra nivea* Broderip from the Pacific Ocean.

Fig. 2. *Subcancilla attenuata* (Broderip) from the tropical eastern Pacific.

Fig. 3. *Domiporta filaris* (Linnaeus) from the Pacific Ocean.

Fig. 4. *Neocancilla clathrus* (Gmelin) from the Pacific Ocean.

Fig. 5. *Scabricola desetangii* (Kiener) from the Indian Ocean.

Fig. 6. *Imbricaria conularis* (Lamarck) from the Pacific Ocean.

Fig. 7. *Pterygia nucua* (Gmelin) from the Pacific Ocean.

Fig. 8. *Vexillum (Costellaria) cophinum* (Gould) from the Pacific Ocean.

Fig. 9. *V. (C.) nodospiculum* Cernohorsky from the Philippine Islands.

Fig. 10. *Vexillum (Pusia) tricolor* (Gmelin) from the Mediterranean.

Fig. 11. *Thala foveata* (Sowerby) from the Caribbean.

Fig. 12. *Austromitra rubiginosa* (Hutton) from New Zealand.

papillae are absent, the siphon is long or short, thick or slender and simple at the distal end. The eyes are simple, the pupil is either unicoloured or ringed, and the eyes are situated near the extremity of the broad base of the tentacles. The proboscis is very long or moderately short and the tentacles are pointed. The animal of the South African deep water genus *Charitodoron* lacks eyes according to Barnard (1960). Animals are dioecious, the penis is variable but generally curved and pointed and situated behind the right tentacle; in life the penis lies entirely under the mantle facing towards the apex of the shell. The proboscis contains an odontophore which is secured to the wall by a pair of nerve tissues. Salivary glands are paired or coalescing and parts of the hypobranchial gland are modified for the secretion of dibromogotin; this purple mucus has an obnoxious odour and considerable staining properties but is harmless to humans. Vayssi re (1901) and Risbec (1955), in their study on the anatomy of Mitridae, reported the presence of a "venom gland" in some species of Mitridae. This particular gland, which is called the "accessory proboscis" by Kohn (1970), is a slender, pointed organ which was observed by the writer to protrude and retract at moderate speed when the animal is handled. The real function of this "accessory proboscis" is unknown according to Kohn (1970), but the gland in the Caribbean *Thala foveata* (Sowerby) is actually used in killing prey.

Sand-dwelling Mitridae are carnivorous, and the large *Vexillum* species have been observed to feed on small sand-shrimps. Reef-dwelling Mitridae are presumed to be detritus feeders subsisting on microorganism attached to the hard substrate. Kohn (1970), in his study of the food habits of the reef-dwelling *Mitra (Strigatella) litterata* Lamarck, found the species to be vermivorous and to feed on sipunculid worms, particularly *Phascolosoma scolops* (Selenka & DeMan) and *Aspidosiphon elegans* (Chamisso and Eysenhardt).

Mitridae deposit their egg-capsules on a suitable substrate, in the case of reef-dwelling species on rocks or coral boulders and in the case of sand-dwelling species on weed. The egg-capsules are claviform or banana-shaped, and are deposited in loose asymmetrical clusters of 15 to 100 capsules per cluster. Each capsule containing 100 to 500 white, cream or translucent-yellow eggs (Plate 2). According to Ostergaard (1950), Mitridae have a free-swimming veliger larva, reaching the free-swimming stage 2 weeks from the date of incubation. Spawns have been described and illustrated

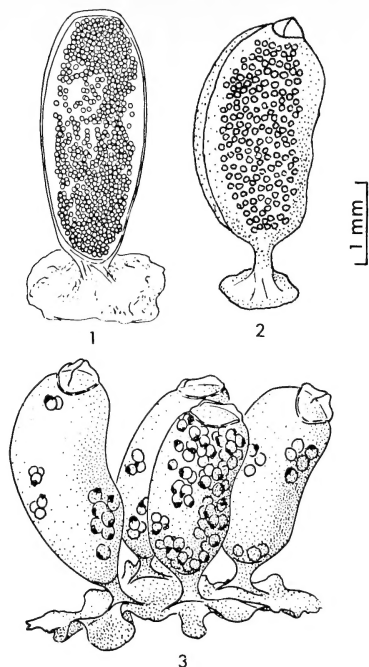


Plate 249. Egg capsules of Mitridae.

Fig. 1. *Mitra (Mitra) idae* Melvill. Mission Point, California (from J. Cate, 1968, textfig. 8) [no dimensions given].

Fig. 2. *Mitra (Strigatella) paupercula* (Linnaeus). Nakuna, Okinawa, Ryukyu Islands.

Fig. 3. *M. (S.) tristis* Broderip. Bahia de los Angeles, Mexico; height of capsule c. 2.0 mm (from Wolfson, 1969, fig. 1, as *M. dolorosa* Dall).

by Ostergaard (1950), Cernohorsky (1966, 1970), Zavodnik (1967), J. Cate (1968) and Wolfson (1969).

Mitridae have their share of natural enemies and sand-dwelling species appear to fall prey to molluscan predators more frequently than reef-dwellers. Naticidae and Muricidae are the main predators, and drill round holes up to 3 mm in diameter on the periphery of the penultimate and antepenultimate whorls. Bursidae and Cymatiidae will also attack species of Mitridae.

Radulae

The radulae of Mitridae are of the rachiglossate type, with 3 teeth per row, formula 1-1-1. Only the genus *Pterygia* Röding, has a radula which lacks



Plate 250. Radula of *Mitra mitra* (Linnaeus), type-species of the genus *Mitra*. Complete transverse row. Fig. A. rachidian or central tooth. Fig. B. lateral tooth.

lateral teeth (formula 0-1-0). The length of the radular ribbon fluctuates from 3% to 21% of shell-length, and the number of rows of teeth per 1 mm of ribbon length vary from 5 to 190. In the subfamily Mitrinae the rachidian teeth are subquadrate or rectangular and have deeply rooted cusps (Plate 250A), and the laterals are 1.75 to 4.0 times as broad as the rachidians and carry numerous cusps (Plate 250B). The radular teeth in the Imbricariinae are considerably modified but still essentially of the mitrine type, while the radula of *Cylindromitridae* consists of only rachidians but no lateral teeth. In the Vexillinae the rachidians are bowshaped, and tri-cuspid to multicuspid and the laterals are smaller, sickle-shaped, unicuspid and of a similar type as in the Muricidae (Plate 251). The front end of the radular ribbon shows considerable wear on the teeth particularly in the first one or two dozen rows of teeth; the end of the ribbon has up to a dozen thin, and as yet not fully developed replacement teeth, termed the nascentes. Radular studies in the Mitridae have proved invaluable in a supra-specific classification and in the evaluation of relationships within groups of families.

Distribution

Recent Mitridae live in warm and temperate waters of both hemispheres, extending from Latitude 42°N to 42°S. The majority of Mitridae however, inhabit tropical seas and most species live in the Indo-Pacific region. In the subfamily Mitrinae alone, 87 species inhabit the tropical Indo-Pacific, 15 live in the tropical eastern Pacific, 6 in the western Atlantic, 5 in the eastern Atlantic (2 of which are shared with the Mediterranean-Adriatic region), 6 on the southern tip of South Africa and 4 on the southern part of Australia (1 species being shared with New Zealand) (Plate 252).

Mitridae made their first appearance during the Upper Cretaceous in Europe, North America and India; during the Eocene they penetrated as far as Indonesia and New Zealand; and in the Miocene extended out to various Pacific Island groups. During the Miocene the major generic groups

were already well represented. The glacial periods of Europe decimated the once flourishing Mio-Pliocene mitrid fauna, and only 4 species now survive in the Mediterranean-Adriatic region. Other species, e.g. *Mitra* (*Sohlia*) *carbonacea* (Hinds) and *Cancilla scrobiculata crosnieri* Cernohorsky, migrated during the glacial period to warmer waters of northwest Africa, where they became established and still survive but having become extinct in the Mediterranean.

During the Tertiary, when there was no Panama land bridge separating the Caribbean from the eastern Pacific, there was a free intermingling of species drawing on a common genetic pool. The Panama land bridge barrier was in full operation during early Pleistocene (Woodring, 1966), and separated the once common fauna in two marine biological provinces. The morphological similarity between some eastern Pacific and Caribbean mitrid analogues, e.g. *M. swainsonii*-*M. antillen-*

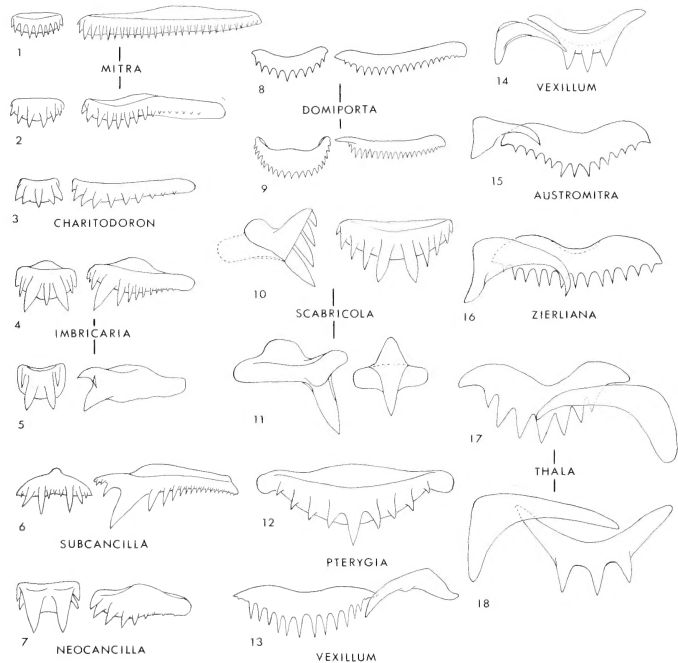
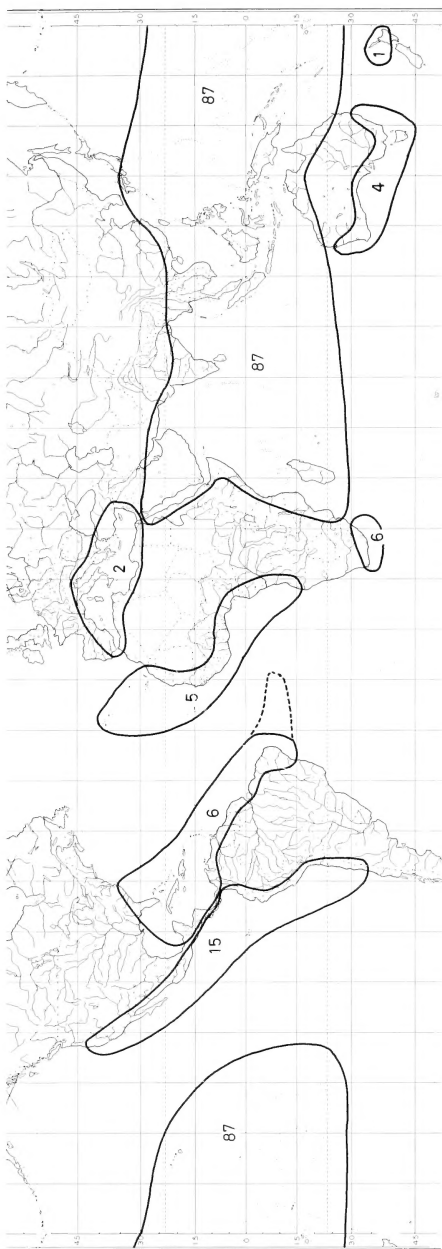


Plate 251. Radulae types in the Mitridae. Only one-half row of the radula is illustrated (formula 1 + 1 + 1).

- Fig. 1. *Mitra* (*Mitra*) *coffa* Schubert & Wagner from the Pacific Ocean.
 Fig. 2. *Mitra* (*Strigatella*) *scutulata* (Gmelin) from the Pacific Ocean.
 Fig. 3. *Charitodoron pasithea* Tomlin from South Africa (after Barnard, 1959, fig. 11c, as *Mitra* (*Dibaphus*) *bathybius* Barnard).
 Fig. 4. *Imbricaria conularis* (Lamarck) from the Pacific Ocean.
 Fig. 5. *I. olicaeformis* (Swainson) from the Pacific Ocean.
 Fig. 6. *Subcancilla lineata* (Broderip) from Panama.
 Fig. 7. *Neocancilla papilio* (Link) from the Pacific Ocean.
 Fig. 8. *Domipora filaris* (Linnaeus) from the Pacific Ocean.
 Fig. 9. *D. praestantissima* (Röding) from the Pacific Ocean.
 Fig. 10. *Scabricola variegata* (Gmelin) from the Pacific Ocean.

- Fig. 11. *S. desetangsii* (Kiener) from the Indian Ocean.
 Fig. 12. *Pterygia nucula* (Gmelin) from the Pacific Ocean (full row; formula 0 + 1 + 0).
 Fig. 13. *Vexillum* (*Vexillum*) *plicarium* (Linnaeus) from the Pacific Ocean.
 Fig. 14. *Vexillum* (*Pusia*) *patriarchalis* (Gmelin) from the Pacific Ocean.
 Fig. 15. *Austromitra rubiginosa* (Hutton) from New Zealand.
 Fig. 16. *Zierliana woldemarii* (Kiener) from the Philippine Islands.
 Fig. 17. *Thala gratiosa* (Reeve) from the Gulf of California (after McLean, 1967, fig. 1—as *Mitromica solitaria* C. B. Adams).
 Fig. 18. *T. jeancateae* Sphon from the Galápagos Islands (after Sphon, 1969, fig. 1).



sis, *M. effusa*-*M. barbadensis*, *M. inca*-*M. nodulosa* and *Thala gratiosa*-*T. foveata*, clearly suggest a common ancestry during the Tertiary.

Classification

The Linnaean species of Mitridae were originally contained in the Linnaean genus *Voluta*, with the exception of a single species which was assigned to *Buccinum*. Lamarck (1798) proposed the genus *Mitra* for the species formerly contained in *Voluta*, and Röding (1798) proposed *Vexillum* and *Pterygia* in the same year. Swainson (1831) proposed the family-group Mitridae, and the superficially similar Volutomitridae Gray, 1854, previously assigned to either the Volutidae or Mitridae, have in the meantime been segregated in a family of their own.

Thiele (1929) arranged the living species of Mitridae in 23 generic units, while Wenz (1943) proposed a generic arrangement for both fossil and living Mitridae consisting of 35 generic groups. In a recent study of supra-specific systematics of the Mitridae and Volutomitridae, the writer (1970) proposed a more modern arrangement of living and fossil Mitridae with the retention of 28 generic units. This re-evaluation has been based on shell-features, anatomy, distribution and phylogeny, and generic groups formerly based only on the colour of the shell or periostracum (e.g. *Atrimitra* Dall), have been discarded, as they are of no value in modern taxonomy. Two important changes have been made in this paper: the generic groups *Fusimitra* Conrad and *Sohlia* Cernohorsky, have been removed from the Imbricariinae and assigned to the Mitrinae.

Lectotypes of species (where more than one specimen is present in the type-series and no holotype has been selected by the original author), have been selected throughout this paper and this selection is a formal lectotype designation. In the selection of lectotypes we have been guided by the original author's cited dimensions and illustrations; if no dimensions or illustrations were given, the specimen most closely conforming to the description has been selected as the lectotype. In cases where the illustration does not conform with the description or the illustration consists of two composite species, more weight has been placed on the description.



Plate 252. World distribution of Recent Mitrinae. The number of living species is indicated for each of the major oceanic regions.

Below are listed the recognized generic and specific taxa for the subfamily Mitrinae appearing in part 1 of this monograph. Those preceded by a dagger (†) are fossil only. The list contains 202 fossil and living world-wide species and subspecies, of which 123 are living. The 168 European Tertiary species listed on p. 227, have not been included in this list, since the majority of species described by Bellardi are probable synonyms and cannot be considered to constitute recognized taxa.

List of Recognized Taxa

Family Mitridae Swainson, 1831 Subfamily Mitrinae

GENUS *Mitra* Lamarck, 1798

Subgenus *Mitra* Lamarck, 1798

mitra (Linnaeus, 1758). Type. Recent, Indo-Pacific

papalis (Linnaeus, 1758). Recent, Indo-Pacific
stictica (Link, 1807). Recent, Indo-Pacific
bovei Kiener, 1838. Recent, Red Sea to western India

cardinalis (Gmelin, 1791). Recent, Indo-Pacific
nubila nubila (Gmelin, 1791). Recent, Indo-Pacific

nubila lamarckii Deshayes, 1832. Recent, Hawaiian Islands

rossiae Reeve, 1844. Recent, Indian Ocean
ambigua Swainson, 1829. Recent, Indo-Pacific
coffea Schubert & Wagner, 1829. Recent, Indo-Pacific

fasciolaris Deshayes in Laborde & Linant, 1834. Recent, Red Sea

imperialis Röding, 1798. Recent, Indo-Pacific
incompta (Lightfoot, 1786). Recent, Indo-Pacific

eremitarum Röding, 1798. Recent, Indo-Pacific
guttata Swainson, 1824. Recent, Indian Ocean
solida Reeve, 1844. Recent, East Australia
inquinata Reeve, 1844. Recent, East Asia, Japan

†*inquinata buddhaica* Vredenburg, 1923. Miocene, Burma

†*tittabweensis* Vredenburg, 1923. Miocene, Burma

†*singuiensis* Vredenburg, 1922. Miocene, Burma
pele Cernohorsky, 1970. Recent, Polynesia, Hawaiian Ids.

chinensis Griffith & Pidgeon, 1834. Recent, Indian Ocean, China, Japan

†*semicincta* K. Martin, 1931. Eocene, Indonesia

†*subscrobiculata* d'Orbigny, 1852. Miocene, India, Burma

†*birmanica* Vredenburg, 1923. Miocene, Burma
†*loochooensis* MacNeil, 1960. Miocene, Ryukyu Islands

†*quilonensis* Dey, 1962. Miocene, India
triplicata von Martens, 1904. Recent, Indian Ocean, N.W. Pacific

nivea (Broderip, 1836). Recent, Pacific Ocean
ustulata Reeve, 1844. Recent, Indo-Pacific
ancillides Broderip, 1836. Recent, Tuamotu Archipelago

variabilis Reeve, 1844. Recent, Australia
chalybeia Reeve, 1844. Recent, West Australia
cookii Sowerby, 1874. Recent, S.E. Australia
carbonaria Swainson, 1822. Recent, Australia, New Zealand

†*multisulcata* Harris, 1897. Miocene, S.E. Australia

glabra Swainson, 1821. Recent, Australia
†*coxi* (Ludbrook, 1958). Pliocene, S.E. Australia

picta Reeve, 1844. Recent, South Africa
latruncularia Reeve, 1844. Recent, South Africa

aerumnosa Melvill, 1888. Recent, South Africa
subflava (Kuroda & Habe, 1971). Recent, Japan

†*notoensis* (Masuda, 1967). Miocene, Japan
†*dainitiensis* Makiyama, 1927. Pliocene, Japan

†*thukusimana* Nomura & Zinbo, 1935. Miocene, Japan

†*ishidae* Masuda, 1967. Miocene, Japan
†*kurakiensis* Hatai & Nisiyama, 1952. Pliocene, Japan

†*cosibensis* Otuka, 1937. Pliocene, Japan
†*takii* Ozaki, 1958. Pliocene, Japan

†*hectori* Hutton, 1905. Eocene, New Zealand
fulgurita Reeve, 1844. Recent, E. Indian Ocean, W. Pacific

†*junghuhni* K. Martin, 1880. Mio-Pliocene, Indonesia

†*granatinaeformis* K. Martin, 1884. Miocene, N.E. Indian Ocean, W. Pacific; Pliocene, Indonesia

gilbertsoni (J. Cate, 1968). Recent, West Australia

orientalis Griffith & Pidgeon, 1834. Recent, west coast tropical South America

idae Melvill, 1893. Recent, tropical east Pacific
semigranosa von Martens, 1897. Recent, west coast tropical South America

fultoni E. A. Smith, 1892. Recent, tropical east Pacific

caliginosa Reeve, 1844. Recent, ? west coast tropical South America

- †*fusiformis fusiformis* (Brocchi, 1814). Miocene, Europe
- fusiformis zonata* Marryat, 1818. Recent, Adriatic Sea, Mediterranean, tropical east Atlantic
- cornicula* (Linnaeus, 1758). Recent, Adriatic Sea, Mediterranean, tropical east Atlantic
- goreensis* Melvill, 1925. Recent, tropical west Africa
- nigra* (Gmelin, 1791). Recent, tropical east Atlantic
- Subgenus ***Fusimitra*** Conrad, 1855
- †*conquisita* Conrad, 1848. **Type.** Eocene-Oligocene, S.E. United States
- †*scotlandica* Trechmann, 1925. Eocene, West Indies
- †*vasana* Dickerson, 1915. Eocene, California
- †*neta* Gardner, 1945. Eocene, Texas
- †*titian* Gabb, 1873. Miocene, Caribbean
- swainsonii swainsonii* Broderip, 1836. Recent, tropical east Pacific
- swainsonii antillensis* Dall, 1889. Recent, N. Carolina, Caribbean
- †*swainsonii dunbari* Olsson, 1932. Miocene, northern South America
- †*limonensis* Olsson, 1922. Miocene, Central and South America
- †*sieversi* Rutsch, 1934. Miocene, Venezuela
- †*berlineri* Maury, 1917. Miocene, Caribbean
- Subgenus ***Eumitra*** Tate, 1889
- †*alokiza* Tenison-Woods, 1880. **Type.** Miocene, S.E. Australia
- †*dictua* Tenison-Woods, 1880. Miocene, S.E. Australia
- †*ductua* Tate, 1899. Pliocene, S.E. Australia
- †*uniplica* Tate, 1889. Miocene, S.E. Australia
- †*masfieldi* (Marshall, 1918). Miocene, New Zealand
- †*calcar* (Marshall, 1918). Miocene, New Zealand
- †*waitemataensis* (Powell & Bartrum, 1929). Miocene, New Zealand
- Subgenus ***Nebularia*** Swainson, 1840
- contracta* Swainson, 1840. **Type.** Recent, Indo-Pacific
- coarctata* Reeve, 1844. Recent, Indo-Pacific
- chrysostoma* Broderip, 1836. Recent, Indo-Pacific
- ferruginea* Lamarck, 1811. Recent, Indo-Pacific
- rubritincta* Reeve, 1844. Recent, Indo-Pacific
- cucumerina* Lamarck, 1811. Recent, Indo-Pacific
- chrysalis* Reeve, 1844. Recent, Indo-Pacific
- fraga* Quoy & Gaimard, 1833. Recent, Indo-Pacific
- †*ardjunoii* Beets, 1941. Miocene, Indonesia
- proscissa* Reeve, 1844. Recent, Indo-Pacific
- tabanula* Lamarck, 1811. Recent, Indo-Pacific
- turgida* Reeve, 1845. Recent, Indo-Pacific
- avenacea* Reeve, 1845. Recent, Indo-Pacific
- solanderi* Reeve, 1844. Recent, ? Indian Ocean
- doliolum* Küster, 1839. Recent, Indo-Pacific
- atjehensis* Oostingh, 1939. Recent, Indo-Pacific; Pliocene, Indonesia
- maesta* Reeve, 1845. Recent, Indo-Pacific
- suturata* Reeve, 1845. Recent, S.E. Asia
- †*vandervlerki* Beets, 1941. Miocene, Indonesia
- †*gerthi* Pannekoek, 1936. Miocene, Indonesia
- †*kyaugonensis* Vredenburg, 1923. Miocene, Burma
- †*brachyspira* Cossmann & Pissarro, 1909. Eocene, India
- †*sowerbyi sowerbyi* d'Orbigny, 1852. Miocene, India
- †*sowerbyi sedanensis* K. Martin, 1906. Miocene, Indonesia
- sowerbyi kingae* Cernohorsky, 1972. Recent, Indonesia
- †*molengraaffi* K. Martin, 1916. Miocene, Indonesia
- rosacea* Reeve, 1845. Recent, S.E. Asia, N.W. Australia, Japan
- rubiginosa* Reeve, 1844. Recent, Indo-west Pacific
- pyramis* (Wood, 1828). Recent, Indo-Pacific
- aurantia aurantia* (Gmelin, 1791). Recent, Indo-Pacific
- aurantia subruppeli* Finlay, 1927. Recent, Gulf of Oman and W. India
- ruepellii* Reeve, 1844. Recent, Red Sea and Gulf of Aden
- ticaonica* Reeve, 1844. Recent, Indo-Pacific
- vexillum* Reeve, 1844. Recent, western Pacific
- fulvescens* Broderip, 1836. Recent, Indo-Pacific
- telescopium* Reeve, 1844. Recent, Indo-Pacific
- testacea* Broderip, 1836. Recent, Polynesia
- lugubris* Swainson, 1821. Recent, Pacific Ocean
- coronata* Lamarck, 1811. Recent, Indo-Pacific
- amaura* Hervier, 1897. Recent, Pacific Ocean
- aurora aurora* Dohrn, 1861. Recent, Polynesia and Hawaiian Islands
- aurora floridula* Sowerby, 1874. Recent, Indo-Pacific
- vultuosa* Reeve, 1845. Recent, Pacific Ocean
- luctuosa* A. Adams, 1853. Recent, Indo-Pacific
- punctostriata* A. Adams, 1855. Recent, Indian Ocean
- †*bomasensis* K. Martin, 1916. Miocene, Indonesia
- †*kelirensis* K. Martin, 1916. Miocene, Indonesia

- puncticulata* Lamarck, 1811. Recent, Indo-Pacific
- sanguinolenta* Lamarck, 1811. Recent, East Africa
- sophiae* Crosse, 1862. Recent, Pacific Ocean
- crenata* (Broderip, 1836). Recent, tropical east Pacific
- sphoni* Shasky & Campbell, 1964. Recent, tropical east Pacific
- effusa* Broderip, 1836. Recent, tropical east Pacific
- belcheri* Hinds, 1844. Recent, tropical east Pacific
- †*tyasila* Olsson, 1930. Eocene, Peru
- †*lens* (Wood, 1828). Recent, tropical east Pacific
- †*muricata* (Broderip, 1836). Recent, tropical east Pacific
- †*gausapata* Reeve, 1845. Recent, Galápagos Islands
- †*inca* d'Orbigny, 1841. Recent, tropical east Pacific
- †*nodulosa* (Gmelin, 1791). Recent, Florida, Gulf of Mexico, Brazil
- †*rudis* Gabb, 1873. Miocene, Caribbean
- †*barbadensis* (Gmelin, 1791). Recent, Florida, Brazil, Ascension Island
- †*acteoglypha* Gardner, 1937. Miocene, Florida
- †*straminea* A. Adams, 1853. Recent, Florida and Caribbean
- †*almagrensis* Toulou, 1911. Mio-Pliocene, east coast central America
- †*poas* Olsson, 1922. Miocene, east coast central America
- †*semiferruginea* Reeve, 1845. Recent, Florida and Caribbean
- †*woodringi* Vokes, 1938. Miocene, Trinidad
- Subgenus *Dibaphus* Philippi, 1847
- †*edentula* Swainson, 1823. **Type.** Recent, Indo-Pacific
- †*multiplicata* (Pease, 1865). Recent, Indo-Pacific
- †*crassilabra* (Gabb, 1873). Miocene, Caribbean
- Subgenus *Dibaphimitra* Cernohorsky, 1970
- †*florida* Gould, 1856. **Type.** Recent, Florida and Caribbean
- †?†*javanensis* Altena, 1938. Miocene, Indonesia
- †*dennanti* Tate, 1889. Miocene, S.E. Australia
- †*transylvanica* Hoernes & Auinger, 1880. Miocene, Europe
- Subgenus *Strigatella* Swainson, 1840
- †*paupercula* (Linnaeus, 1758). **Type.** Recent, Indo-Pacific
- †*pica* (Dillwyn, 1817). Recent, Indian Ocean, N.W. Pacific
- †*retusa* Lamarck, 1811. Recent, Indo-Pacific
- †*litterata* Lamarck, 1811. Recent, Indo-Pacific
- †*auriculoides* Reeve, 1845. Recent, Indo-Pacific
- †*assimilis* Pease, 1868. Recent, Indo-Pacific
- †*flavocingulata* Lamy, 1938. Recent, Easter Id., Pacific Ocean.
- †*scutulata* (Gmelin, 1791). Recent, Indo-Pacific
- †*decurtata* Reeve, 1844. Recent, Indo-Pacific
- †*colombelliformis* Kiener, 1838. Recent, Indo-Pacific
- †*acuminata* Swainson, 1824. Recent, Indo-Pacific
- †*fastigium* Reeve, 1845. Recent, Indo-Pacific
- †*pellisserpentis* *pellisserpentis* Reeve, 1844. Recent, Indo-Pacific
- †*pellisserpentis* *astricta* Reeve, 1844. Recent, Hawaiian Ids.
- †*bellula* A. Adams, 1853. Recent, ? Indo-Pacific
- †*typha* Reeve, 1845. Recent, Indo-Pacific
- †*peculiaris* Reeve, 1845. Recent, Indo-Pacific
- †*tristis* Broderip, 1836. Recent, tropical east Pacific
- †*mesolia* Pilsbry & Johnson, 1917. Miocene, Caribbean
- Subgenus *Sohlia* Cernohorsky, 1970
- †*conoidea* Matheron, 1843. **Type.** Upper Cretaceous, Europe
- †*carbonacea* *carbonacea* (Hinds, 1844). Recent, tropical west Africa
- †*carbonacea* *caterinii* Meneghini, 1868. Pleistocene, Italy
- GENUS *Dentimitra* von Koenen, 1890
- †*circumcisa* (Beyrich, 1854). **Type.** Oligocene, Europe
- †*impressa* (von Koenen, 1890) [name preoccupied]. Oligocene, Europe
- †*rhenana* (Görge, 1941). Oligocene, Europe
- †*tenius* (Beyrich, 1854). Oligocene, Europe
- †*quinqueplicata* (Ravn, 1902). Paleocene, Europe
- †*dilatata* (Briart & Cornet, 1871). Paleocene, Europe
- †*crenifunata* (Cossmann, 1896). Eocene, Europe
- †*degrangei* (Oppenheim, 1906). Eocene, Europe
- †*obesa* (F. E. Edwards, 1856). Eocene, England
- †*cretacea* (Gabb, 1864). Eocene, California
- †*simplicissima* (Cooper, 1894). Eocene, California
- †*murietta* (Anderson & Hanna, 1925). Eocene, California
- †*clementensis* (Hanna, 1927). Eocene, California
- †*marylandica* (Clark, 1896). Paleocene, Maryland

- †*columbellaeformis* (K. Martin, 1931) [name preoccupied]. Eocene, Indonesia
 †*rustica* (K. Martin, 1931). Eocene, Indonesia
GENUS *Paleofusimitra* Sohl, 1963
 †*elongata* Sohl, 1963. **Type.** Upper Cretaceous, S.E. United States
GENUS *Charitodoron* Tomlin, 1932
barbara (Thiele, 1925). **Type.** Recent, South Africa
agullhasensis (Thiele, 1925). Recent, South Africa
thalia Tomlin, 1932. Recent, South Africa

DOUBTFUL TAXA OF MITRINAE

Generic Taxa Rejected From The Mitridae

(For detailed discussion on these non-mitrid genera see Cernohorsky, 1970, Bull. Auckl. Inst. Mus., No. 8)

- Aidone* H. & A. Adams, 1853, Gen. Rec. Mollusca, vol. 1, p. 172. **Type:** by monotypy *Mitra insignis* A. Adams, 1853. Type locality: Rains Island, Pacific Ocean. The holotype of *M. insignis* (B.M.N.H. No. 1966465) is a juvenile specimen of the Indo-Pacific columbellid *Pyrene ligula* (Duclos).
Clifdenia Laws, 1932, Trans. N. Z. Inst., vol. 62, p. 196. **Type:** by original designation *C. turneri* Laws, 1932. Type locality: Clifden, (Altonian), Mid-Miocene of New Zealand. The holotype of *C. turneri* (AIM No. TM-177) is a volutid species of the subfamily Scaphellinae.
Clinomitra Bellardi, 1888, Mem. R. Accad. Sci. Torino, vol. 38, p. 152. **Type:** by monotypy *C. rovasendae* Bellardi, 1888. Type locality: Terno-fourà, Mid-Miocene of Italy. *Clinomitra* is a synonym of the mitromorphine turrid genus *Mitrolumna* Bucquoy, Dautzenberg & Dollfus.
Compsomitra Marwick, 1942, Trans. Roy. Soc. N. Z., vol. 72, p. 278. **Type:** by original designation *C. incisa* Marwick, 1942. Type locality: Hampden Beach, (Bortonian), Mid-Eocene of New Zealand. *Compsomitra* is a synonym of the volutomitrid genus *Waimatea* Finlay.
Conomitra Conrad, 1865, Amer. Journ. Conchology, vol. 1, p. 25. **Type:** by subsequent designation by Fischer, 1884, *Mitra fusoides* Lea, 1833.

Type locality: Claiborne, Mid-Miocene of Alabama. The genus has been transferred to the family Volutomitridae.

- Cymakra* Gardner, 1937, U.S. Geol. Surv. Prof. Paper, No. 142F, p. 421. **Type:** by original designation *C. poncei* Gardner, 1937. Type locality: Chipola River, Lower Miocene of Florida. The holotype of *C. poncei* (USNM No. 371438) is a mitromorphine turrid.
Diptychomitra Bellardi, 1888, Mem. R. Accad. Sci. Torino, vol. 38, p. 152. **Type:** by subsequent designation by Pace, 1902, *D. eximia* Bellardi, 1888. Type locality: Terno-fourà, Mid-Miocene of Italy. *Diptychomitra* is a synonym of the turrid genus *Mitrolumna* Bucquoy, Dautzenberg & Dollfus.
Gosavia Stoliczka, 1866, Sitzungsber. k. k. Akad. Wiss. Wien, vol. 52, p. 179. **Type:** by original designation *Voluta squamosa* Zekeli, 1852. Type locality: Gosau, Upper Cretaceous of Austria. This non-mitrid genus most probably belongs to the family Conidae.
Lapparia Conrad, 1855, Proc. Acad. Nat. Sci. Philadelphia, vol. 7, p. 260. **Type:** by monotypy *Mitra dumosa* Conrad in Wailes, 1854. Type locality: Jackson, Eocene of Mississippi. *Lapparia* belongs to the volutid subfamily Volutithinae.
Latiomitra Locard, 1897, Exped. Scient. Trav. "Talisman", vol. 1, p. 321. **Type:** by monotypy *L. specialis* Locard, 1897 = *Mitra cryptodon* Fischer, 1882. Type locality: West of Morocco, Atlantic Ocean, 1900 metres. *Latiomitra* is a genus in the family Volutomitridae.
Microvoluta Angas, 1877, Proc. Zool. Soc. London, p. 34. **Type:** by monotypy *M. australis* Angas, 1877. Type locality: Port Jackson, New South Wales, 25 fathoms. The genus belongs in the family Volutomitridae.
Mitreola Swainson, 1833, Zool. Illustrations, ser. 2, vol. 3, pl. 128. **Type:** by subsequent designation by Hermannsen, 1847, *Mitra monodonta* Lamarck, 1803. Type locality: Grignon, Paris Basin, Eocene of France. *Mitreola* is closely related to the still living species of *Euaeta* H. & A. Adams, 1853, and belongs to the volutid subfamily Lyriinae.

- Mitricaulis* Pilsbry, 1944, Proc. Acad. Nat. Sci. Philadelphia, vol. 96, p. 142. **Type:** by original designation *M. incarum* Pilsbry, 1944. Type locality: Between Quebrada Alamira and Isla de Macuya, Pachitea River, ? Eocene of Eastern Peru. This non-mitrid genus is probably not a marine member at all, but a freshwater fossil with cerithiacean features.
- Mitrolumna* Bucquoy, Dautzenberg & Dollfus, 1883, Moll. Mar. Roussillon, vol. 1, pp. 115, 121. **Type:** by original designation *Mitra olivoidea* Cantraine, 1835. Type locality: Mediterranean. *Mitrolumna* is a genus in the family Turridae.
- Mitropsis* Pease, 1868, Amer. Journ. Conchology, vol. 3, p. 211. **Type:** by monotypy *M. fusiformis* Pease, 1868 (*nom. praeocc.*) = *Columbella paumotensis* Tryon, 1883. Type locality: Tuamotu Archipelago. Originally referred to the Mitridae by Pease, the genus actually belongs to the family Columbellidae.
- Neoimbricaria* von Ihering, 1907, Ann. Mus. Nac. Buenos Aires, vol. 7, pp. 196, 198. **Type:** by subsequent designation by Cossmann, 1909, *Voluta patagonica* von Ihering, 1897. Type locality: Patagonia, Miocene of South America. *Neoimbricaria* closely resembles New Zealand species of *Pachymelon* Marwick, and the genus would be more appropriately placed in the volutid subfamily Alciethinae.
- Parvimitra* Finlay, 1930, Trans. N. Z. Inst., vol. 61, p. 63. **Type:** by original designation *P. pukeuriensis* Finlay, 1930. Type locality: Pukeuri, Oamaru, Otago, (Awamoan), Lower Miocene of New Zealand. The holotype of *P. pukeuriensis* (AIM No. TM-591) is a volutomitrid species of the genus *Proximitra* Finlay, 1927.
- Peculator* Iredale, 1924, Proc. Linn. Soc. New South Wales, vol. 49, p. 269. **Type:** by monotypy *P. verconis* Iredale, 1924. Type locality: Twofold Bay, New South Wales, 15-25 fathoms. *Peculator*, an offshoot of the Tertiary *Conomitra* belongs to the family Volutomitridae.
- Perplicaria* Dall, 1890, Trans. Wagner Free Inst. Sci. Philadelphia, vol. 3, p. 90. **Type:** by monotypy *P. perplexa* Dall, 1890. Type locality: Caloosahatchie beds, Pliocene of Florida. Wilson, 1948, Nautilus, vol. 61, p. 112, reviewed the systematic position of *Perplicaria* and assigned the genus to the Cancellariidae.
- Pleioptygma* Conrad, 1863, Proc. Acad. Nat. Sci. Philadelphia, vol. 14, p. 563. **Type:** by monotypy *Voluta carolinensis* Conrad, 1840. Type locality: Natural Well, Duplin County, Upper Miocene of North Carolina. The shell features of *Pleioptygma* are consistent with the Volutidae, and the genus should be referred to the volutid subfamily Scaphellinae.
- Proximitra* Finlay, 1927, Trans. N. Z. Inst., vol. 57, p. 410. **Type:** by original designation *Vexillum (Costellaria) rutidolum* Suter, 1917. Type locality: Foot of Mount Horrible, (Otaian), Lower Miocene of New Zealand. *Proximitra* is a genus in the family Volutomitridae.
- Vexillitra* Marwick, 1931, N. Z. Geol. Surv. Paleont. Bull., No. 13, p. 125. **Type:** by original designation *V. balteata* Marwick, 1931. Type locality: Akiripuraho Stream, Whaingaromia, Gisborne District, Mid-Miocene of New Zealand. *Vexillitra* is a synonym of the volutomitrid genus *Proximitra* Finlay.
- Volutomitra* H. & A. Adams, 1853, Gen. Rec. Mollusca, vol. 1, p. 172. **Type:** by subsequent designation by Fischer, 1884, *Mitra groenlandica* Beck in Möller, 1842. Type locality: Greenland. *Volutomitra* is the type genus of the family Volutomitridae.
- Volvaria* Lamarck, 1801, Syst. anim. sans vertèbres, p. 93. **Type:** by monotypy *V. bulloides* Lamarck, 1801. Type locality: Paris Basin, Eocene of France. The genus, which has been erroneously referred to the Mitridae, belongs to the opisthobranch superfamily Acteonacea.
- Volvariella* Fischer, 1883, Manuel de Conchyliologie, pt. 6, p. 553. **Type:** by monotypy *V. lamareckii* Deshayes, 1865. Type locality: Laversine, Paris Basin, Eocene of France. Similar to *Volvaria* Lamarck, the genus is referable to the superfamily Acteonacea.
- Waimatea* Finlay, 1927, Trans. N. Z. Inst., vol. 57, p. 408. **Type:** by original designation *Mitra inconspicua* Hutton, 1885. Type locality: Waihao greensands, (Kaiatan), Upper Eocene of New Zealand. *Waimatea* is a genus in the family Volutomitridae.

Doubtful Generic Taxa

Butonina Beets, 1943, Leidsche geol. Meded., vol. 13, p. 290. **Type:** by original designation *B. nudata* Beets, 1943. Type locality: Buton Island, Upper Oligocene of Indonesia. The incomplete and badly preserved type of *B. nudata* allows only mere speculation as to the familial placement of *Butonina*.

Egestas Finlay, 1927, Trans. N. Z. Inst., vol. 57, p. 411. **Type:** by original designation *Vexillum waitei* Suter, 1909. Type locality: N.E. of Wreck Reef, Stewart Island, New Zealand, 50-54 fathoms. The protoconch, unnotched base and disposition of columellar folds, disassociate *Egestas* from the Mitridae. Shell features bear a resemblance to the latirine species of Fasciolaridae, but only an examination of the soft parts can decide the taxonomic position of the genus.

Pyrenomitra Eames, 1952, Philos. Trans. Roy. Soc. London, vol. 236, p. 105. **Type:** by original designation *P. anachis* Eames, 1952. Type locality: Rakhi Nala, Upper Eocene of West Pakistan. The types of *P. anachis* are post-veligers (length 3.1 mm) of either a pusine mitrid or a volutomitrid of the genus *Conomitra* Conrad.

Species Described in the Genus *Mitra* and Now Excluded from the Mitridae

A detailed taxonomic evaluation of these non-mitrid taxa together with a familial re-assignment and synonymy, may be found in Cernohorsky (1972). Three species names are here added to the list.

Mitra affinis Lesson, 1842 = Olividae
M. alabamensis Tomlin, 1920 = Buccinidae
M. albopicta E. A. Smith, 1898 = Volutomitridae
M. alizalis Anderson & Hanna, 1925 = Volutomitridae
M. (Terebrifusus) amoena de Gregorio, 1890 = Buccinidae
M. (Conomitra) angulata Heilprin, 1887 = Volutomitridae
M. anticoronata Johnston, 1880 = Volutomitridae
M. apicalis Hutton, 1873 = Volutomitridae
M. (Mitromorpha) aptycha Boettger, 1906 = Turridae

M. (Cancilla) armorica Suter, 1917 = Volutomitridae
M. attractoides Tate, 1889 = Volutomitridae
M. atypa Tate, 1889 = Volutomitridae
M. (Turris) bairdii Dall, 1889 = tentatively Volutomitridae
M. (Mitreola) bernayi Cossmann, 1889 = Volutidae
M. berthelini Cossmann, 1897 = Volutomitridae
M. biconica Whitfield, 1865 = Turridae
M. biconica Sykes, 1911 = Turridae
M. bicornis Laws, 1936 = Volutomitridae
M. biplicata Philippi, 1847 = Turridae
M. buplicata Hanley in Wood, 1856 = Columbellidae
M. bolaris Conrad, 1833 = Volutidae
M. (Mitreola) bonneti Cossmann, 1901 = Volutidae
M. broccii de Serres, 1829 = Columbellidae
M. calcarata Sasso, 1827 = Cancellariidae
M. carolinensis Conrad, 1841 = Volutidae
M. cassida Tate, 1889 = Volutomitridae
M. (Mitreola) chaussyensis Cossmann, 1906 = Volutidae
M. circumfossa Beyrich, 1854 = Volutomitridae
M. citharella Lamarck, 1803 = Volutidae
M. citharella d'Orbigny, 1850 = *Auricula citharella* Deshayes, 1835
M. citharelloides Tate, 1889 = Turridae
M. claibornensis Conrad, 1860 = Volutidae
M. clandestina Reeve, 1845 = Turridae
M. clathrata Reuss, 1845 = ? Fasciolaridae
M. clathurella Tate, 1889 = Volutomitridae
M. coarctata Tenison-Woods, 1880 = Marginellidae
M. columbellaria Scacchi, 1837 = Turridae
M. columbellata Grateloup, 1847 = Columbellidae
M. columbellina A. Adams, 1853 = Columbellidae
M. columbelloides Anton, 1839 = Volutidae
M. columbulae Brusina, 1865 = Columbellidae
M. complanata Tate, 1889 = Volutomitridae
M. concinna Beyrich, 1854 = Volutomitridae
M. conulidalis Tate, 1889 = Volutomitridae
M. conuliformis Cossmann, 1897 = Volutomitridae
M. corrugata Defrance in Blainville, 1824 = Volutomitridae
M. costulata Risso, 1826 = Columbellidae
M. cotteau Cossmann & Lambert, 1884 = Volutomitridae
M. crassidens Deshayes, 1835 = Volutidae

- M. crymochara* Rochebrune & Mabilley, 1885 = Volutomitridae
M. cryptodon Fischer, 1882 = Volutomitridae
M. daphnelloides Tenison-Woods, 1880 = Turridae
M. decussata Dujardin, 1837 = Turridae
M. delheidi Glibert, 1957 = Volutomitridae
M. dewalquei Briart & Cornet, 1871 = Volutomitridae
M. diasticta Cossmann, 1897 = Volutomitridae
M. distorta Philippi, 1887 = Fasiolariidae
M. doliata Conrad, 1833 = Volutidae
M. dubia Hutton, 1873 = Marginellidae
M. dubia de Gregorio, 1890 = Volutidae
M. dumasi Cossmann, 1897 = Volutidae
M. dumosa Conrad in Wailes, 1854 = Volutidae
M. eburnea Grateloup, 1834 = Marginellidae
M. elegans H. C. Lea, 1840 = Buccinidae
M. enysi Hutton, 1873 = Volutomitridae
M. (Volutomitra) exigua von Maltzan, 1884 = Turridae
M. extensa von Koenen, 1890 = Volutomitridae
M. flaccida Yokoyama, 1928 = Marginellidae
M. flemingii Lea, 1833 = Volutidae
M. columbellaria var. *fulva* Brusina, 1870 = Turridae
M. fusellina Lamarck, 1803 = Volutomitridae
M. fusoides Lea, 1833 = Volutomitridae
M. georgiana Conrad, 1850 = Volutidae
M. gervillii Payraudeau, 1826 = Columbidae
M. godini Cossmann, 1891 = Volutomitridae
M. gracilis H. C. Lea, 1840 = Volutomitridae
M. graminatula Dall, 1927 = Turridae
M. graniformis Lamarck, 1803 = Volutomitridae
M. granulifera Lamarck, 1811 = Muricidae
M. groenlandica Beck in Möller, 1842 = Volutomitridae
M. haleanus Whitfield, 1865 = Volutidae
M. hammakeri Harris, 1894 = Volutomitridae
M. haycocki Dall & Bartsch, 1911 = Turridae
M. (Pleioptygma) heilprini Cossmann, 1899 = Volutidae
M. hondana Yokoyama, 1922 = Volutomitridae
M. hordeola Deshayes, 1865 = Volutomitridae
M. hualpensis Philippi, 1887 = Buccinidae
M. humboldti Lea, 1833 = Volutidae
M. hypermeces Cossmann, 1897 = Volutomitridae
M. inaspecta Deshayes, 1865 = Volutomitridae
M. inconspicua Hutton, 1885 = Volutomitridae
M. inornata Beyrich, 1854 = Volutomitridae
M. insignis A. Adams, 1853 = Columbidae
M. jervaisensis Laceron, 1951 = Volutomitridae
M. kobayashii Yokoyama, 1927 = Cancellariidae
M. labiata Deshayes, 1865 = Volutidae
M. labiata Grzybowski, 1899 = ? Columbidae
M. labratula Lamarck, 1803 = Volutidae
M. labrosa Deshayes, 1835 = Volutidae
M. lachryma Reeve, 1845 = Columbidae
M. lajoi Deshayes, 1835 = Volutidae
M. lamberti Fleming, 1828 = Volutidae
M. lennieri Cossmann & Pissarro, 1901 = Volutomitridae
M. leontocroma Brusina, 1866 = Turridae
M. (Conomitra) fusoides lepa de Gregorio, 1890 = Volutomitridae
M. ligata Tate, 1889 = Volutomitridae
M. lineata Schumacher, 1817 = in part Oleacinidae and Mitridae
M. lineolata Heilprin, 1887 = Volutidae
M. longissima Giebel, 1864 = Volutidae
M. lyraeformis Swainson, 1821 = Volutidae
M. lyrata Sasso, 1827 = Cancellariidae
M. marginata Lamarck, 1803 = Volutomitridae
M. michaudi Michelotti, 1847 = Turridae
M. minima Seguenza, 1880 = Volutomitridae
M. miranda E. A. Smith, 1891 = Volutomitridae
M. mitraeformis Sasso, 1827 = Cancellariidae
M. mixta Lamarck, 1803 = Volutomitridae
M. mokattamensis Oppenheim, 1906 = Volutidae
M. monodi Knudsen, 1956 = Turridae
M. monodonta Lamarck, 1803 = Volutidae
M. mooreana Gabb, 1860 = Volutidae
M. mortenseni Odhner, 1924 = Volutomitridae
M. (Terebrifusus) multiplicata de Gregorio, 1890 = Buccinidae
M. murchisoni Müller, 1851 = Volutidae
M. mutica Lamarck, 1803 = Volutidae
M. namnetica Cossmann, 1897 = Volutomitridae
M. nana Müller, 1851 = Fasiolariidae
M. nice Nardo, 1847 = non mitrid
M. nitida Pictet & Campiche, 1864 = Fasiolariidae
M. nodosa Borson, 1820 = Strombidae
M. obliquata Deshayes, 1835 = Volutidae
M. obscura Hutton, 1873 = Volutomitridae
M. obsoleta Philippi, 1836 = Turridae
M. olivoidea Cantraine, 1835 = Turridae
M. olivula Baudon, 1853 = Volutidae
M. orcutti Dall, 1920 = Turridae
M. othone Tenison-Woods, 1880 = Volutomitridae
M. pactilis Conrad, 1833 = Volutidae
M. paeteli Dohrn, 1860 = ? Columbidae
M. panaulax Cossmann, 1901 = Turridae
M. (Mitromorpha) parapytycha Böttger, 1906 = Turridae

- M. parisiensis* Deshayes, 1832 = Volutidae
M. parkinsoni Lea, 1833 = Volutidae
M. parva J. de C. Sowerby, 1823 = Volutomitridae
M. pauciplicata Yokoyama, 1928 = Volutidae
M. pergracilis Harris, 1899 = Fascioliariidae
M. perlonga Martin, 1884 = Turridae
M. perminuta Sandberger, 1863 = Volutomitridae
M. (Strigatella) perturbatrix Maury, 1917 = Volutidae
M. (Mitrea) pezzanti Cossmann, 1906 = Volutidae
M. pica Reeve, 1845 = Volutomitridae
M. pirula Yokoyama, 1922 = Volutomitridae
M. piruliformis Muller, 1851 = Volutidae
M. (Thala) pleurotomoides E. A. Smith, 1890 = Turridae
M. plicifera Yokoyama, 1920 = Volutidae
M. (Volutomitra) porcellana Melvill & Standen, 1912 = Volutomitridae or Marginellidae
M. prorecta F. E. Edwards, 1856 = Volutomitridae
M. potomacensis Clark & Martin, 1901 = Fascioliariidae
M. prevosti Roualt, 1850 = Volutidae
M. prisca Deshayes, 1865 = Volutomitridae
M. pristina Yokoyama, 1923 = Nassariidae
M. (Pleioptygma) prodroma Gardner, 1937 = Volutidae
M. pumila J. de C. Sowerby, 1823 = Volutomitridae
M. cancellina var. *quadriplicata* Nyst in Dewalque, 1868 = Volutidae
M. rangii Lesson, 1837 = Not a mollusc
M. raricosta Lamarck, 1803 = Volutidae
M. ravni Harder, 1913 = Volutomitridae
M. roborea Reeve, 1845 = Fascioliariidae
M. rugosa Philippi, 1847 = Volutidae
M. lineolata saginata Tucker & Wilson, 1933 = Volutidae
M. scabra J. de C. Sowerby, 1823 = Volutidae
M. scalariformis Borson, 1820 = Cancellariidae
M. secalina von Koenen, 1890 = Volutomitridae
M. sellei de Raincourt, 1885 = Volutidae
M. parva var. *semilaevis* F. E. Edwards, 1856 = Volutomitridae
M. semimarginata Beyrich, 1854 = Volutomitridae
M. semisculpta Beyrich, 1854 = Volutomitridae
M. (Volutomitra) separanda von Maltzan, 1884 = Turridae
M. soellingensis Speyer, 1864 = Volutomitridae
M. spinosa Pictet & Campiche, 1864 = ? Turridae
M. stadialis Hedley, 1911 = Volutomitridae
M. staminea Conrad, 1848 = Volutomitridae
M. striatella Calcare, 1841 = Turridae
M. striata Lea, 1833 = Volutidae
M. striata Brusina, 1865 = Columbelloidae
M. subcostulata d'Orbigny, 1852 = Volutidae
M. subcrenularis Tate, 1889 = Volutomitridae
M. subdecussata d'Orbigny, 1852 = Turridae
M. subplicata Deshayes, 1835 = Volutidae
M. subpunctis Harris, 1896 = ? Fascioliariidae
M. subsubulata d'Orbigny, 1852 = Columbelloidae
M. subulata Grateloup, 1847 = Columbelloidae
M. sulcifera von Koenen, 1890 = Volutomitridae
M. tenuiplicata Vasseur, 1881 = Volutomitridae
M. terebraeformis Conrad, 1848 = Buccinidae
M. teretiuscula Thiele, 1925 = Volutomitridae
M. tetraptacta Cossmann, 1885 = Volutomitridae
M. (Thala?) torticula Dall, 1889 = Turridae
M. tringa Lamarck, 1811 = Columbelloidae
M. turgidula Borson, 1820 = Columbelloidae
M. typostigma Brusina, 1866 = Columbelloidae
M. umbilicaris Sasso, 1827 = Cancellariidae
M. cotteui var. *umbilicata* Cossmann & Lambert, 1884 = Volutomitridae
M. varicosa Sowerby, 1850 = Turridae
M. varicosa Tate, 1889 = Fascioliariidae
M. varicosa Hutton, 1873 = Marginellidae
M. vicina Briart & Cornet, 1871 = Volutidae
M. vicksburgensis Conrad, 1848 = Volutomitridae
M. (Conomitra) vincenti Cossmann, 1889 = Volutomitridae
M. washingtoniana Weaver, 1912 = Volutidae
M. waleleti Briart & Cornet, 1871 = Volutomitridae
M. (Diptychomitra) werneri Böttger, 1902 = Turridae
M. zebra Küster, 1839 = Volutidae
M. zekelii Pictet & Campiche, 1864 = Fascioliariidae
M. zilpha Dall, 1927 = Turridae

Spurious species in Mitridae

This section contains names of Mitridae which are either invalid, unidentifiable or have been suppressed by the International Commission on Zoological Nomenclature for taxonomic purposes.

Röding, 1798, Museum Boltenianum, pp. 135-138, created the following nude names: *Mitra biverter*, *M. caelata*, *M. cinnamomea*, *M. elegantissima*, *M. flammeola*, *M. granularis*, *M. inops*, *M. lutea*, *M. margaritacea*, *M. nivea*, *M. nobilis*,

M. pulcherrima, *M. sanguinea*, *M. stricta* and *M. vittata*.

D'Orbigny, 1850-52, *Prodrome de Paléontologie Stratigraphique Universelle*, created *nomina nuda*, some of which have been subsequently validated by other authors: *Mitra requieni*, *M. terebelloides*, *M. vignyensis* all of d'Orbigny, 1850, and *M. grateloupi* d'Orbigny, 1852.

Mitra miocaenica Dollfus & Dautzenberg, 1886 (non Michelotti, 1847) and *M. chrysallidoformis* Dollfus & Dautzenberg, 1886, listed in the *Feuille des jeunes Naturalistes*, Paris, on p. 102, are both *nomina nuda*.

***Mitra acarensis* Chavanne, 1910**

Remarks—The species is unidentifiable.

Synonymy—

1910 *Mitra acarensis* Chavanne, *Bull. Cart. géol. Algerie*, no. 4, p. 283 (Algeria; Tertiary).

***Mitra adolphia* Risso, 1826**

Remarks—This 18.0 mm long species is unidentifiable.

Synonymy—

1826 *Mitra adolphia* Risso, *Hist. nat. l'Europe mérid.*, vol. 4, p. 246 (Europe, subfossil).

***Mitra agassizii* Roualt, 1850**

Remarks—The species remains unidentified.

Synonymy—

1850 *Mitra agassizii* Roualt, *Mém. Soc. géol. France*, vol. 3, p. 499, pl. 18, figs. 13, 13a (Bos d'Arros, Pau, France; Eocene).

***Mitra aizyensis* Deshayes, 1865**

Remarks—The small, 9.0 mm long specimen may possibly be a *Conomitra*.

Synonymy—

1865 *Mitra aizyensis* Deshayes, *Desc. anim. sans vert. Bass. Paris*, vol. 3, p. 579, pl. 103, figs. 6, 7 (Aizy, Paris Basin; Eocene).

***Mitra aquini* O. Costa, 1844**

Remarks—The species is unidentifiable.

Synonymy—

1844 *Mitra aquini* O. Costa, *Atti R. Accad. Sci. Napoli*, vol. 5, p. 62.

***Mitra babea* Valenciennes in Humboldt and Bonpland, 1832**

Remarks—This species has not been illustrated, but the large size, i.e. 54.0 mm, and de-

scription suggest a tropical *Vexillum* species which does not live in West America. Carpenter (1857) commented that several of the species described by Valenciennes came from the East Indies, and of those assigned to Acapulco may appear to have crossed the Pacific by the agency of man.

Synonymy—

1832 *Mitra babea* Valenciennes in Humboldt & Bonpland, *Voy. Int. Amér. Coq. mar.*, vol. 2, p. 332 (Acapulco, Mexico); 1857 Carpenter, *Rept. Brit. Assoc. Adv. Science*, for 1856, p. 171.

***Mitra borniana* Risso, 1826**

Remarks—The 14.0 mm long specimen is unidentifiable.

Synonymy—

1826 *Mitra borniana* Risso, *Hist. nat. l'Europe mérid.*, vol. 4, p. 246 (Fossile à la Trinité, Europe).

***Mitra bourguignati* Locard, 1892**

Remarks—The species is unidentifiable from the description.

Synonymy—

1892 *Mitra bourguignati* Locard, *Ann. Soc. Linn. Lyon*, vol. 37, p. 48 (Mediterranean).

***Mitra branderi* Defrance in Blainville, 1824**

Remarks—The species is unidentifiable.

Synonymy—

1824 *Mitra branderi* Defrance in Blainville, *Dict. Sci. Nat.*, vol. 31, p. 492 (Hauteville, France; Eocene).

***Mitra capucina* Röding, 1798**

Remarks—Röding refers to *Voluta pertusa* var. Gmelin, 1791. Gmelin's species is composed of no less than four different species and Röding's name remains a *nomen dubium*.

Synonymy—

1798 *Mitra capucina* Röding, *Mus. Boltenianum*, p. 136 (Locality unknown).

***Mitra carnea* O. Costa, 1844**

Remarks—The species is unidentifiable.

Synonymy—

1844 *Mitra carnea* O. Costa, *Atti R. Accad. Sci. Napoli*, vol. 5, p. 63.

***Mitra cenomanensis* Guéranger, 1853**

Remarks—The species is unidentifiable.

Synonymy—

1853 *Mitra cenomanensis* Guéranger, *Essai paléont. Sarthe*, p. 32 (Mans, France; Upper Cretaceous).

Mitra cheniourensis Chavanne, 1910

Remarks—The species is unidentifiable.

Synonymy—

1910 *Mitra cheniourensis* Chavanne, Bull. Cart. geol. Algerie, ser. 4, no. 4, p. 283 (Algeria; Tertiary).

Mitra cincta Newton, 1891

Remarks—This species was only listed but not described in the Systematic List of the Edwards collection of British Oligocene Mollusca in the British Museum, and is a *nomen nudum*. There is a prior *Mitra cincta* Roualt, 1850.

Mitra cingulata Philippi, 1850

Remarks—The 16.0 mm-long species which was said to resemble *M. aurantia* (Gmelin, 1791), is unidentifiable. The name is preoccupied by *Mitra cingulata* Lamarck, 1811.

Synonymy—

1850 *Mitra cingulata* Philippi, Zeit. Malakozoologie, vol. 7, p. 28 (Locality unknown) [non Lamarck, 1811].

Mitra cingulosa Monterosato, 1872

Remarks—Occasionally listed with this author's name and date in Mediterranean faunal lists. I have been unable to trace a valid description for this Italian Pliocene species from Montepellegrino.

Voluta clathrata Gmelin, 1791

Remarks—This is an unidentifiable mitrid species.

Synonymy—

1791 *Voluta clathrata* Gmelin, Syst. naturae, ed. 13, p. 3455 (refers to Lister, pl. 819, fig. 34) (American Ocean).

Voluta clathrata Link, 1807

Remarks—No references to figures have been cited by the author and the description is too brief for even a generic identification. The name is preoccupied by *Voluta clathrata* Gmelin, 1791.

Synonymy—

1807 *Voluta clathrata* Link. Besch. Nat.-Samml. Univ. Rostock, p. 127.

Mitra clavulus Lamarck, 1811

Remarks—The species has not been illustrated and the type is lost. The description resembles a species similar to *Mitra vexillum* Reeve, but a positive determination is uncertain.

Synonymy—

1811 *Mitra clavulus* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 219 (Locality unknown).

Bulla conoidea Linnaeus, 1767

Remarks—The specific name has been suppressed by the International Commission on Zoological Nomenclature in Opinion 841 (1968).

Mitra crassidens Broderip & Sowerby, 1829

Remarks—The species is unidentifiable and the types could not be traced.

Synonymy—

1829 *Mitra crassidens* Broderip & Sowerby, Zool. Journal, vol. 4, p. 372 (Locality unknown; collected by Capt. Sir E. Belcher).

Mitra crinita Cristofori & Jan, 1832

Remarks—The species is unidentifiable.

Synonymy—

1832 *Mitra crinita* Cristofori & Jan, Cat. Mus. Conch. foss., vol. 2, p. 14.

Mitra cucurbitina Philippi, 1850

Remarks—The diagnosis is applicable to about four species in the subgenus *Nebularia* Swainson.

Synonymy—

1850 *Mitra cucurbitina* Philippi, Zeit. Malakozoologie, vol. 7, p. 27 (China?).

Mitra cylindracea Doderlein, 1862

Remarks—The species is unidentifiable. The name is preoccupied by *Mitra cylindracea* Reeve, 1844.

Synonymy—

1862 *Mitra cylindracea* Doderlein, Cenn. geol. terr. mioc. Ital., p. 25 (Italy; Tertiary). [non Reeve, 1844].

Mitra dacostai Rothpletz & Simonelli, 1891

Remarks—The species is unidentifiable.

Synonymy—

1891 *Mitra dacostai* Rothpletz & Simonelli, Zeit. deut. geol. Gesell., vol. 42, p. 719 (refers to da Costa, 1866, p. 68, pl. 12, fig. 13) (La Vista S. Roque, Canary Islands; Upper Miocene).

Voluta decussata Gmelin, 1791

Remarks—The species may not even be a mitrid. The species depicted in the Chemnitz figure has the appearance of a *Peristernia*.

Synonymy—

1791 *Voluta decussata* Gmelin, Syst. naturae, ed. 13, p. 3454 (refers to Chemnitz, vol. 4, pl. 150, fig. 1395) (Locality unknown).

***Mitra deluciformis* Oppenheim, 1923**

Remarks—The species is unidentifiable.

Synonymy—

1923 *Mitra deluciformis* Oppenheim, Eoc. Faun. Herzegovina, p. 85 (Herzegowina, Yugoslavia; Eocene).

***Mitra dichroma* A. Adams, 1853**

Remarks—The type is not in the British Museum (Nat. Hist.), and the species cannot be identified from the description.

Synonymy—

1853 *Mitra dichroma* A. Adams, Proc. Zool. Soc. London, pt. 19, p. 140 (Locality unknown).

***Voluta discors* Gmelin, 1791**

Remarks—Dodge, 1955, p. 93, considers *V. discors* to be a synonym of the Indo-Pacific *Pyrene punctatum* (Brugière, 1789), whereas Hörnes, 1856, Abh.k.k. geol. Reichsanst., vol. 3, p. 115, reports the species living in the Mediterranean. Hanley, 1856, Wood's Index Testaceologicus, p. 106 and Cernohorsky, 1967, Journ. of Conchology, vol. 26, p. 168, considered *Voluta discors* Gmelin to be a prior name for *Mitra maculosa* Reeve, 1844. On reviewing the evidence and bearing in mind the different interpretations of the species represented by the solitary Chemnitz figure, it is concluded that Gmelin's description and figure citation are inadequate for an unequivocal elucidation, and *Voluta discors* is considered to be a *nomen dubium*.

Synonymy—

1791 *Voluta discors* Gmelin, Syst. naturae, ed. 13, p. 3455 (refers to Chemnitz, vol. 4, pl. 150, fig. 1400) (Locality unknown).

***Mitra douglasensis* Turner, 1938**

Remarks—This is a questionable mitrid species which has the appearance of a *Latirus* Montfort.

Synonymy—

1938 *Mitra douglasensis* Turner, Geol. Soc. America Pap., no. 10, p. 74, pl. 15, fig. 6 (Umpqua River, W. Oregon; Eocene).

***Mitra eburnea* Garrett, 1880**

Remarks—This is an unidentifiable small mitrid, which according to Garrett is similar to *M. ancillides* Broderip, 1836. The types were destroyed in the Hamburg Museum. The name is preoccupied by *Mitra eburnea* Grateloup, 1834.

Synonymy—

1880 *Mitra eburnea* Garrett, Journ. of Conch., vol. 3, p. 15 (Anaa Id., Pacific [Tuamotus]) [non Grateloup, 1834].

***Mitra elegantula* Küster, 1839**

Remarks—The figured specimen could be either a small example of *Mitra (Nebularia) lugubris* (Swainson) or a juvenile of *Vexillum (Pusia) tuberosum* (Reeve).

Synonymy—

1839 *Mitra elegantula* Küster, Syst. Conch. Cab., ed. 2, vol. 5, p. 103, pl. 17, figs. 6-8 (Islands of the East Indies).

***Voluta episcopalis* Linnaeus, 1758**

Remarks—This specific name has been suppressed for taxonomic usage by the International Commission on Zoological Nomenclature in Opinion 885 of 1969. It refers to what is now known as *Mitra mitra* (Linnaeus, 1758).

***Voluta fasciata* Schröter, 1804**

Remarks—The species is an unidentifiable mitrid.

Synonymy—

1804 *Voluta fasciata* Schröter, Arch. Zool. Zootomie, vol. 4, p. 40 (Locality unknown).

***Mitra fasciarioides* Anton, 1839**

Remarks—The species is unidentifiable.

Synonymy—

1839 *Mitra fasciarioides* Anton, Verz. Conchylien, p. 68 (spelling corrected to *M. fasciarioides* on p. xvi) (Paris Basin; Eocene).

Plate 253

Fig. 1. *Mitra mitra* (Linnaeus). Bikenibeu, Tarawa Id., Gilbert Islands.

2. *Mitra papalis* (Linnaeus). Meli Id., Efate Id., New Hebrides.

3, 4. *Mitra stictica* (Link). 3, Leleuvia Id., Fiji Islands. 4, Bikenibeu, Tarawa Id., Gilbert Islands.

5, 6. *Mitra cardinalis* (Gmelin). 5, Leleuvia Id., Fiji Islands. 6, Vila, Efate Id., New Hebrides.

7, 8, 13, 14. *Mitra nubila nubila* (Gmelin). 7, forma *brettinghami* E. A. Smith; Yewalu reef, W. off Viti Levu, Fiji Islands. 8, Porto Amelia, Mozambique, East Africa. 13, forma *propinqua* A. Adams; between

Porto Amelia and Mocambique, Mozambique, East Africa. 14, spirally corded form; Marau Sound, Guadalcanal, Solomon Islands.

9, 10. *Mitra bovei* Kiener. 9, Maskali, French Somalia, East Africa. 10, Dahlak Ids., Red Sea.

11. *Mitra incompta* (Lightfoot). Siasi, Sulu Sea, Philippines.

12. *Mitra florida* Gould. Off Fort Lauderdale, Florida.

15. *Mitra nubila* subspecies *lamarcki* Deshayes. Hawaiian Islands.

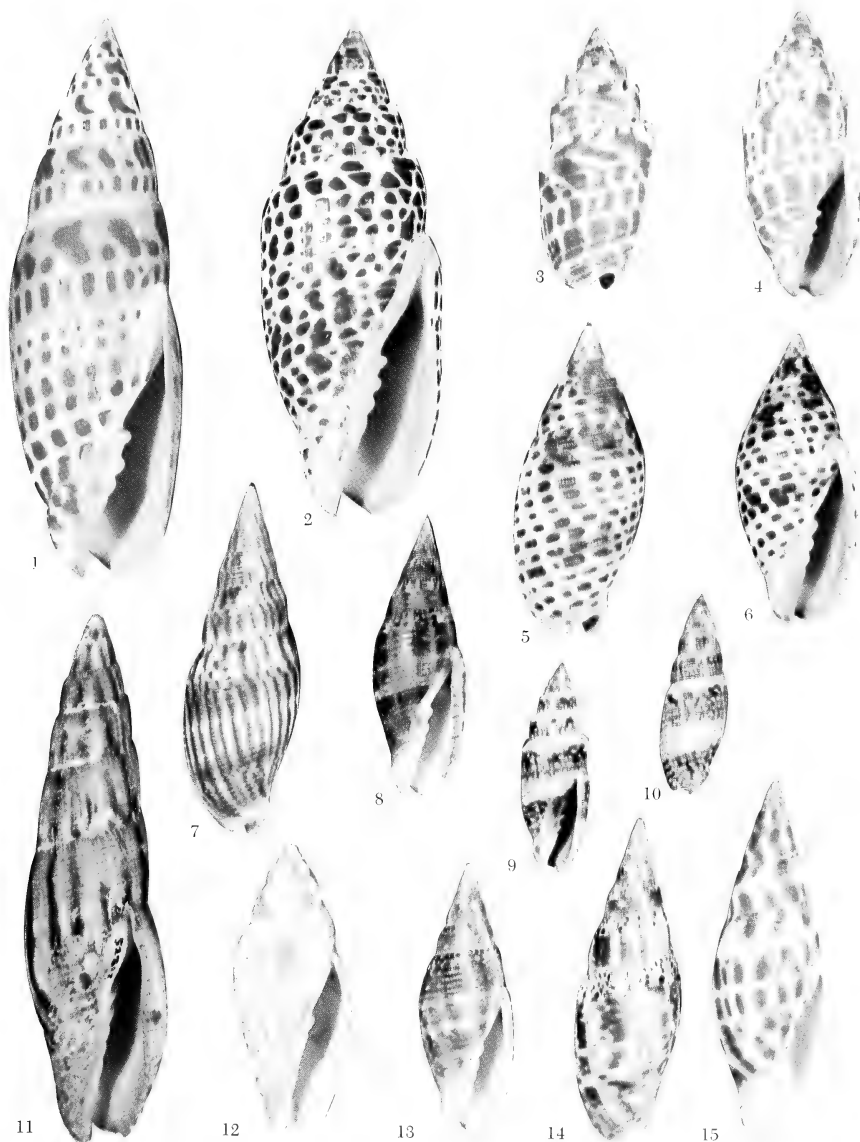


Plate 253 (explanation on opposite page)

Mitra gibba Dohrn, 1860

Remarks—The types could not be located in the British Museum (Nat. Hist.), and the species cannot be identified from the description alone.

Synonymy—

1860 *Mitra gibba* Dohrn, Proc. Zool. Soc. London, p. 368 (New Caledonia).

Mitra (? Thala) gonatophora Sturany, 1903

Remarks—The small, granulose specimen does not appear to be a *Thala* and may possibly be a juvenile turrid.

Synonymy—

1903 *Mitra* (?*Thala*) *gonatophora* Sturany, Denk. Kais. Akad. Wiss. Wien, vol. 74, p. 225, pl. 4, fig. 2 (St. 48-700 metres; St. 51-562 metres, Red Sea).

Mitra gosseleti Briart & Cornet, 1871

Remarks—The species is either a *volutomitrid* *Conomitra* Conrad or a mitrid *Dentimitra* Koenen.

Synonymy—

1871 *Mitra gosseleti* Briart & Cornet, Mém. Acad. Roy. Sci. Lett. Art. Belg., vol. 36, p. 76, pl. 5, figs. 7a-c (Mons, Calcaire grossier, Belgium; Paleocene).

Mitra gottardi Vinassa, 1897

Remarks—The species is unidentifiable.

Synonymy—

1897 *Mitra gottardi* Vinassa, Paleont. Ital., vol. 4, p. 159, pl. 19, figs. 7a,b (Gazzo, Italy; Eocene).

Mitra gracilis O. Costa, 1844

Remarks—The species is unidentifiable. The specific name is preoccupied by *Mitra gracilis* Lea, 1840.

Synonymy—

1844 *Mitra gracilis* O. Costa, Atti R. Accad. Sci. Napol., vol. 5, p. 62 (Mediterranean). [non Lea, 1840]

Mitra gracilis Guéranger, 1853

Remarks—The species is unidentifiable. The name is preoccupied by *Mitra gracilis* Lea, 1840.

Synonymy—

1853 *Mitra gracilis* Guéranger, Essai Paléont. Sarthe, p. 32 (Mans, France; Cretaceous).

Mitra gracilis Ralli, 1940

Remarks—This species may be either *Mitra cornicula* (Linnaeus) or *Vexillum (Pusia) ebenus* (Lamarck). The name is preoccupied by *Mitra gracilis* Lea, 1840.

Synonymy—

1940 *Mitra gracilis* Ralli, Prak. Akad. Athens, vol. 15, p. 446 (Crete; Neogene). [non Lea, 1840].

Mitra granatina Tenison-Woods, 1877

Remarks—The type has been lost and the species may have been an exotic import as suggested by some writers or possibly the same species as *Mitra strangei* Angas. The name is preoccupied by *Mitra granatina* Lamarck, 1811.

Synonymy—

1877 *Mitra granatina* Tenison-Woods, Proc. Roy. Soc. Tasmania, p. 133 (North coast of Tasmania) [non Lamarck, 1811].

Mitra hatchetigbeensis Aldrich, 1886

Remarks—It is difficult to state what species the original figure represents, but the subsequent figure by Harris is that of a fasciolariid.

Synonymy—

1886 *Mitra hatchetigbeensis* Aldrich, Bull. Geol. Surv. Alabama, No. 1, p. 28, pl. 6, fig. 3 (Hatchetigbee Bluff, Alabama; Lower Eocene).

1896 *Mitra hatchetigbeensis* Aldrich, Harris, Bull. Americ. Paleont., vol. 1, no. 4, p. 86, pl. 8, fig. 8 (Black Bluff, Tombigbee River, Midway stage, Alabama; Lower Eocene).

Mitra helvacea Philippi, 1851

Remarks—The species is unidentifiable.

Synonymy—

1851 *Mitra helvacea* Philippi, Zeit. Malakozoologie, vol. 8, p. 84 (China).

Mitra juniperus Strickland, 1847

Remarks—The species is unidentifiable.

Synonymy—

1847 *Mitra juniperus* Strickland, Quart. Journ. Geol. Soc. London, vol. 3, p. 113.

Mitra laevisissima Grateloup, 1834

Remarks—From the figure it is impossible to ascertain whether this species is a *volutid* or a mitrid *Dentimitra* Koenen.

Synonymy—

1834 *Mitra laevisissima* Grateloup, Act. Soc. Linn. Bordeaux, vol. 6, p. 291 (refers to Tabl. Encycl. Meth., pl. 383, fig. 4) (Dax, Gaas, France; Miocene).

Mitra lavocati Salvan, 1954

Remarks—This species is either a *volutomitrid* or mitrid.

Synonymy—

1954 *Mitra lavocati* Salvan, Notes Serv. Min. Maroc, vol. 93, p. 208, pl. 15, fig. 17 (Ganntour, Morocco; Eocene).

Mitra leonardiana Risso, 1826

Remarks—The species has not been illustrated and is unidentifiable from the description.

Synonymy—

1826 *Mitra leonardiana* Risso, Hist. nat. l' Europe mérid., p. 243 (Fossile à la Trinité, Europe).

Mitra leopoliensis Alth, 1850

Remarks—The 17.0 mm-long specimen with 2 folds on the columella, is either a fasciolarid or cerithiid.

Synonymy—

1850 *Mitra leopoliensis* Alth, Nat. Abh. k. k. Akad. Wiss. Wien, vol. 3, p. 222, pl. 11, fig. 20 (Lemberg, Poland; Upper Cretaceous).

Voluta leucosticta Gmelin, 1791

Remarks—The species is a *nomen dubium*. The figure from Knorr cannot be associated with any known species, while the figure from Martyn cited by Gmelin for his var. b, is the species *Canicilla (Domiporta) filaris* Linnaeus).

Synonymy—

1791 *Voluta leucosticta* Gmelin, Systema naturae, ed. 13, p. 3457 (refers to Knorr, pt. 2, pl. 3, fig. 7 for the typical species from unknown locality, and to Martyn, vol. 1, pl. 22—Tonga Ids., for his var. b).

Mitra leucostoma Swainson in Sowerby, 1825

Remarks—The species was never illustrated and cannot be identified from the brief description. The species was compared by the author to *Mitra (Nebularia) lugubris* Swainson. There is a prior *Voluta leucostoma* Gmelin, 1791, which is forgotten senior synonym of *Neocancilla papilio* (Link, 1807).

Synonymy—

1825 *Mitra leucostoma* Swainson in Sowerby, Cat. coll. Tankerville, App. p. 27 (Locality unknown).

Voluta lineata Gmelin, 1791

Remarks—The figure from Chemnitz depicts a small immature specimen which could be either a Pusiine mitrid or a columbellid. The species is a *nomen dubium*.

Synonymy—

1791 *Voluta lineata* Gmelin, Systema naturae, ed. 13, p. 3454 (refers to Chemnitz, vol. 4, pl. 149, figs. 1378, 1379) (Locality unknown).

Mitra lowei Dohrn, 1862

Remarks—The type specimen, supposedly in

Hanley's collection, is not in the British Museum. The species cannot be identified from the description; it could be either a juvenile *Vexillum (Pusia) tricolor* (Gmelin) or a small specimen of *Mitra cornicula* (Linnaeus).

Synonymy—

1862 *Mitra lowei* Dohrn, Proc. Zool. Soc. London, p. 203 (Canary Islands).

Mitra minuta Michelotti, 1847

Remarks—According to Bellardi, 1888, Mem. R. Accad. Sci. Torino, vol. 38, p. 21, the type is not in Michelotti's collection and the species cannot be identified from the brief description. The name is preoccupied by *Mitra minuta* Röding, 1798.

Synonymy—

1847 *Mitra minuta* Michelotti, Nat. Verh. Maat. Haarlem, vol. 3, p. 313 (Torino, Italy; Miocene) [non Röding, 1798].

Voluta morio Linnaeus, 1767

Remarks—The specific name has been suppressed by the International Commission on Zoological Nomenclature in Opinion 841 (1968).

Euthria (Dennantia ?) mystica Suter, 1917

Remarks—This poorly preserved specimen is a questionable mitrid.

Synonymy—

1917 *Euthria (Dennantia ?) mystica* Suter, N. Z. Geol. Surv. Paleont. Bull., No. 5, p. 32, pl. 12, fig. 7 (Coal beds, Kakahu River, Sth. Canterbury, New Zealand; Mid-Eocene).
1970 *Euthria (Dennantia ?) mystica* Suter, Cernohorsky, Bull. Auckland Inst. Mus., No. 8, p. 139.

Mitra newtoni Cossmann, 1899

Remarks—This is a *nomen nudum*. It was proposed as a substitute name for the nude and preoccupied *Mitra cincta* Newton, 1891.

Mitra novaezelandiae Filhol, 1885

Remarks—This is a *nomen nudum*. The name was proposed as a substitute name for the unpublished taxon *Mitra zebra* Hutton.

Voluta oliva Grateloup, 1847

Remarks—The species is either a volutid or a mitrid. The name is preoccupied by *Voluta oliva* Linnaeus, 1758.

Synonymy—

1847 *Voluta oliva* Grateloup, Conch. foss. terr. Tert. Adour, Atlas, Suppl. pl. 1, fig. 8 (Dax, France; Miocene) [non Linnaeus, 1758].



Plate 254A. *Mitra rosacea* Reeve. Living specimen from Queensland, Australia (photo courtesy of Don M. Byrne).

Mitra omalii Briart & Cornet, 1871

Remarks—The 11.0 mm-long specimen is a questionable mitrid.

Synonymy—

1871 *Mitra omalii* Briart & Cornet, Mem. Acad. Roy. Sci. Lett. Art. Belg., vol. 36, p. 71, pl. 5, figs. 10a-c. (Calcaire grossier de Mons, Belgium; Paleocene).

Mitra ordinata "Pease", Garrett, 1880

Remarks—Pease did not describe this species, and Garrett's mention is a *nomen nudum* as in Paetel's (1887, Cat. der Conchyl.-Samml. (Berlin), vol. 1, p. 184.

Mitra ornata Schubert & Wagner, 1829

Remarks—Schubert & Wagner's species is not conspecific with *Mitra ornata* of Kiener, 1838. The illustrated specimen has the appearance of a juvenile *Pterygia nucea* (Gmelin, 1791).

Synonymy—

1829 *Mitra ornata* Schubert & Wagner, Syst. Conch. Cabinet, vol. 12, p. 83, pl. 225, figs. 3098, 3099 (Locality unknown).

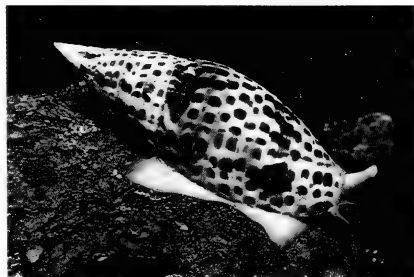


Plate 254. *Mitra cardinalis* (Gmelin). Living specimen from Queensland, Australia (photo courtesy of Don M. Byrne).

Mitra pallida Pease, 1860

Remarks—The type specimen is lost and the species is unidentifiable from the description; it could be either *Neocancilla clathrus* (Gmelin, 1791) or *N. papilio* (Link, 1807). The specific name is preoccupied by *Mitra pallida* A. Adams, 1853).

Synonymy—

1860 *Mitra pallida* Pease, Proc. Zool. Soc. London, p. 146 (Sandwich Ids. = Hawaiian Ids.) [non A. Adams, 1853].

Voluta pertusa Linnaeus, 1758

Remarks—The specific name has been suppressed by the International Commission on Zoological Nomenclature in Opinion 841 (1968).

Mitra plebeia Dohrn, 1860

Remarks—*M. plebeia* was described by Dohrn from the Hawaiian Islands, but in a later publication (1861) the author relegated the species in the synonymy of the South African *M. latruncularia*

Plate 255

- Figs. 1, 2. *Mitra ambigua* Swainson. 1, Chukwani, Zanzibar. 2, Zambales, Luzon, Philippines.
 3, 4. *Mitra coffea* Schubert and Wagner. 3, Niue Island, Pacific Ocean. 4, off Lautoka, W. Viti Levu, Fiji Islands.
 5, 6. *Mitra variabilis* Reeve. Feather reef, Gt. Barrier Reef, Queensland, Australia.
 7, 8. *Mitra eremitarum* Röding. 7, Samar Id., Philippines. 8, Rat Tail Passage, Suva reef, Fiji Islands.
 9. *Mitra fusiformis* subspecies *zonata* Marryat. Gerona, Spain.
 10, 11. *Mitra inquinata inquinata* Reeve. Off Tatsugahama, Kii Province, Japan.
 12, 13. *Mitra fasciolaris* Deshayes in Laborde and

- Linant. Eilat, Gulf of Aqaba, Red Sea.
 14. *Mitra fulgurita* Reeve, forma *yaekoa* Habe and Kosuge. Aramot Id., Siassi Ids., New Guinea.
 15, 16. *Mitra imperialis* Röding. 15, Bushmen's Bay, Malekula Id., New Hebrides. 16, Marau Sound, Guadalcanal, Solomon Islands.
 17, 18. *Mitra chalybeia* Reeve. 17, Shoalwater Bay, Western Australia. 18, Beagle Ids., Western Australia.
 19, 20. *Mitra glabra* Swainson. Semaphore, South Australia.
 21, 22. *Mitra carbonaria* Swainson. 21, Longreef, New South Wales, Australia. 22, forma *badia* Reeve; Cape Vlaming, Rottneest Id., Western Australia.

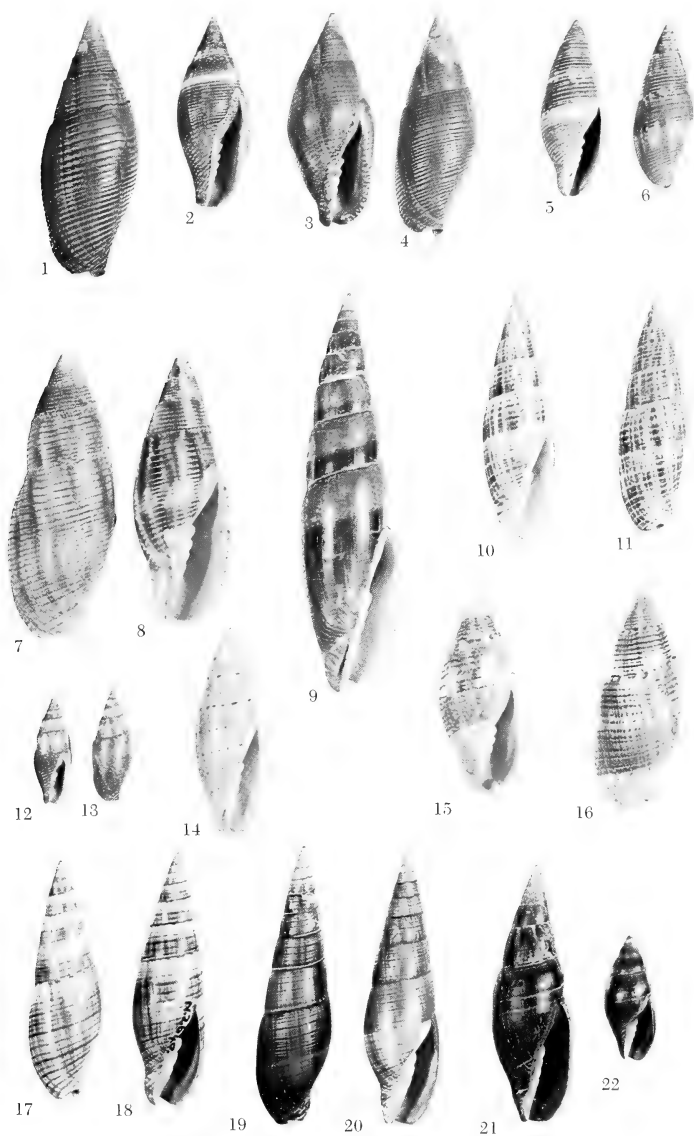


Plate 255 (explanation on opposite page)

Reeve. Although the holotype of *M. plebeia* is very worn and weathered, it is certainly not the same species as *M. latruncularia*, and to complicate matters further, this species, nor the one described by Dohrn, occur in the Hawaiian Islands. The holotype of *M. plebeia* has a sculpture of finely punctate spiral grooves, oblique basal cords and 5 columellar folds.

Synonymy—

1860 *Mitra plebeia* Dohrn, Proc. Zool. Soc. London, p. 368 (Sandwich Islands) [holotype in British Museum (NH) no. 1964413: 23.0 x 8.4 x 11.7 mm].

1861 *Mitra plebeja* (sic) Dohrn, Malakozool. Blatter, vol. 8, p. 137.

***Voluta plicata* Bory St. Vincent, 1827**

Remarks—This is a synonym of the indeterminate *Mitra laevis* Grateloup, 1847. The specific name is preoccupied by *Voluta plicata* Dillwyn, 1817.

Synonymy—

1827 *Voluta plicata* Bory St. Vincent, "Le Liste", explanations to Tabl. Encycl. Methodique, pl. 383, fig. 4 (locality unknown) [non Dillwyn, 1817].

***Mitra plicata* O. Costa, 1850**

Remarks—The species is unidentifiable, and the name is preoccupied by *Mitra plicata* Reeve, 1844.

Synonymy—

1850 *Mitra plicata* O. Costa, Atti Accad. Pontan., vol. 5, p. 388 (non Reeve, 1844).

***Mitra (Volutomitra) porcellana*
Melvill & Standen, 1912**

Remarks—This species is a subantarctic marginellid or volutomitrid.

Synonymy—

1912 *Mitra (Volutomitra) porcellana* Melvill & Standen, Trans. Roy. Soc. Edinburgh, vol. 48, p. 355, fig. 21 (Scotia Bay, Sth. Orkneys, 9–10 fathoms).

1970 *Mitra (Volutomitra) porcellana* Melvill & Standen, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 139.

***Mitra propinqua* Garrett, 1880**

Remarks—The type is not in the Garrett collection in the Bernice P. Bishop Museum, Honolulu, and the species cannot be identified from the description. The name is preoccupied by *Mitra propinqua* A. Adams, 1853.

Synonymy—

1880 *Mitra propinqua* Garrett, Journ. of Conch., vol. 3, p. 22 (Society Ids.) [non A. Adams, 1853].

***Mitra pruinosa* Küster, 1840**

Remarks—According to von Martens, 1904, Wiss. Ergeb. deut. Tief. Exp. "Valdivia", vol. 7, p. 31, *Mitra pruinosa* Küster is a senior synonym of *M. simplex* Dunker, 1846, [is *Vexillum (Pusia) patulum* (Reeve, 1845)]. Küster's illustration, however, seems to represent a juvenile specimen of either *Mitra (Strigatella) fastigium* (Reeve) or *M. luctuosa* (A. Adams).

Synonymy—

1840 *Mitra pruinosa* Küster, Syst. Conch. Cabinet, ed. 2, vol. 5, p. 108, pl. 17a, figs. 3–5 (Locality unknown).

***Mitra pruinosa* Reeve, 1844**

Remarks—The type of *Mitra pruinosa* was in the Norris collection and has been sold at auction. The species cannot be identified from the description and indifferent figure. The specific name is preoccupied by *Mitra pruinosa* Küster, 1840.

Synonymy—

1844 *Mitra pruinosa* Reeve, Conch. Iconica, pl. 22, sp. 171 (Locality unknown) [non Küster, 1840].

***Mitra punctata* Swainson, 1829**

Remarks—Swainson's figure depicts a species which is uniformly brown in colour, inflated-ovate, with a short spire and sculpture consisting of spiral rows of fine punctures; the columella is white and has 6 oblique folds and the interior of the aperture is deep brown. A specimen labelled *Mitra punctata* in the Melvill-Tomlin collection, National Museum of Wales, Cardiff, is a melanistic individual of *Scabricola desetangsii* (Kiener, 1838) and not Swainson's species. The location of the type is unknown, and Swainson's figure and description cannot be associated with any known living species.

Synonymy—

1829 *Mitra punctata* Swainson, Zool. Illus., ser. 2, pl. 30, fig. 3 (Locality unknown).

***Mitra pupula* Dunker in Schmeltz, 1869**

Remarks—This is a *nomen nudum*.

***Mitra pusilla* King & Broderip, 1832**

Remarks—This species which could possibly be a volutomitrid from South America remains unidentified.

Synonymy—

1832 *Mitra pusilla* King & Broderip, Zool. Journal, vol. 5, p. 349 (Locality unknown) [Probably South America].

Mitra reticulata d'Orbigny, 1850

Remarks—This species is a questionable mitrid. Marlière, 1939, Mém. Mus. Roy. d'Hist. Nat. Belg., No. 89, p. 142, includes *Mitra reticulata* d'Orbigny in the synonymy of *M. roemeri* Reuss, 1845 with a query.

Synonymy—

- 1841 *Cerithium reticulatum* Römer, Verst. Norddeutsch. Kreidegebirge, Hannover, p. 79, pl. 11, fig. 18 (Strehlen, N. Germany; U. Cretaceous) [non Perry, 1811].
1850 *Mitra reticulata* d'Orbigny, Prodr. Paléont. strat. Universelle, vol. 2, p. 226 (substitute name for *Cerithium reticulatum* Römer, 1841).

Mitra roemeri d'Orbigny, 1850

Remarks—The species, although similar to *Paleofusimitra elongata* Sohl, is more closely related to the Fascioliariidae and probably belongs to that family.

Synonymy—

- 1845 *Pleurotoma roemeri* Reuss, Verst. Böhm. Kreideform., Stuttgart, pt. 1, p. 43, pl. 9, figs. 10a, b, d only (Luschtitz, Bohemia, Czechoslovakia; U. Cretaceous) [non *Pleurotoma roemeri* Philippi, 1844].
1846 *Fasciolaria roemeri* Reuss, Verst. Böhm. Kreideform., Stuttgart, pt. 2, p. 111.
1850 *Mitra roemeri* d'Orbigny, Prodr. Paleont. strat. Universelle, vol. 2, p. 226 (substitute name for *Fasciolaria roemeri* Reuss, 1846).
1939 *Mitra ? roemeri* Reuss, Marlière, Mém. Mus. Roy. d'Hist. Nat. Belg., no. 89, p. 141, pl. 8, figs. 5a, b (Bracquegnies, Belgium; U. Cretaceous).

Voluta ruffina Linnaeus, 1767

Remarks—The specific name has been suppressed for taxonomic usage by the International Commission on Zoological Nomenclature in Opinion 841 (1968).

Mitra sectilis Pease, 1868

Remarks—The type-specimen appears to have been lost, and the species is unidentifiable from the description alone.

Synonymy—

- 1868 *Mitra sectilis* Pease, Amer. Jour. Conchology, vol. 3, p. 271 (Hawaiian Islands).

Mitra semilivida Tenison-Woods, 1878

Remarks—This name is a *nomen nudum*.

Mitra signata Risso, 1826

Remarks—The species has not been illustrated and is unidentifiable.

Synonymy—

- 1826 *Mitra signata* Risso, Hist. nat. L'Europe mérid., vol. 4, p. 245 (Régiones coralligènes, Europe).

Voluta slevini Dickerson, 1915

Remarks—This species is a questionable mitrid.

Synonymy—

- 1915 *Voluta slevini* Dickerson, Proc. California Acad. Sciences, ser. 4, vol. 5, pp. 34, 44, 75, pl. 11, fig. 16 (Live Oak Creek, Tejon formation, California; Eocene) [as *Mitra slevini* on p. 34].
1925 *Mitra slevini* (Dickerson), Anderson & Hanna, Occas. Pap. California Acad. Sciences, vol. 11, p. 77.

Voluta spadicea Gmelin, 1791

Remarks—Gmelin's description is not in agreement with the cited figure from Chemnitz, which resembles the species *Mitra (Strigatella) scutulata* (Gmelin, 1791). The species remains a *nomen dubium*.

Synonymy—

- 1791 *Voluta spadicea* Gmelin, Systema Naturae, ed. 13, p. 3454 (refers to Chemnitz, vol. 4, pl. 150, fig. 1392) [Locality unknown].

Mitra striatella Bory St. Vincent, 1827

Remarks—The species is an unidentified *Mitra* of the subgenus *Strigatella* Swainson.

Synonymy—

- 1827 *Mitra striatella* Bory St. Vincent, "Le Liste", explanations to the Tabl. Encycl. Méthodique, p. 166, pl. 372, fig. 1 (locality unknown).

Mitra subdermestina Michelotti, 1847

Remarks—According to Bellardi (1888), the type-specimen can no longer be found, and the small, 8.0 mm-long species, is unidentifiable from the description.

Synonymy—

- 1847 *Mitra subdermestina* Michelotti, Nat. Verh. Holl. Maat. Haarlem, vol. 3, p. 313 (Torino, Italy; Miocene).

Mitra succincta Swainson in Sowerby, 1825

Remarks—The type of *M. succincta* has been sold by auction, and the description is appropriate for either *Neocancilla clathrus* (Gmelin, 1791), *N. papilio* (Link, 1807) or *Cancilla (Domiporta) granatina* (Lamarck, 1811). The species is a *nomen dubium*.

Synonymy—

- 1825 *Mitra succincta* Swainson in Sowerby, Cat. shells coll. Tankerville, App. p. 26 (Locality unknown).

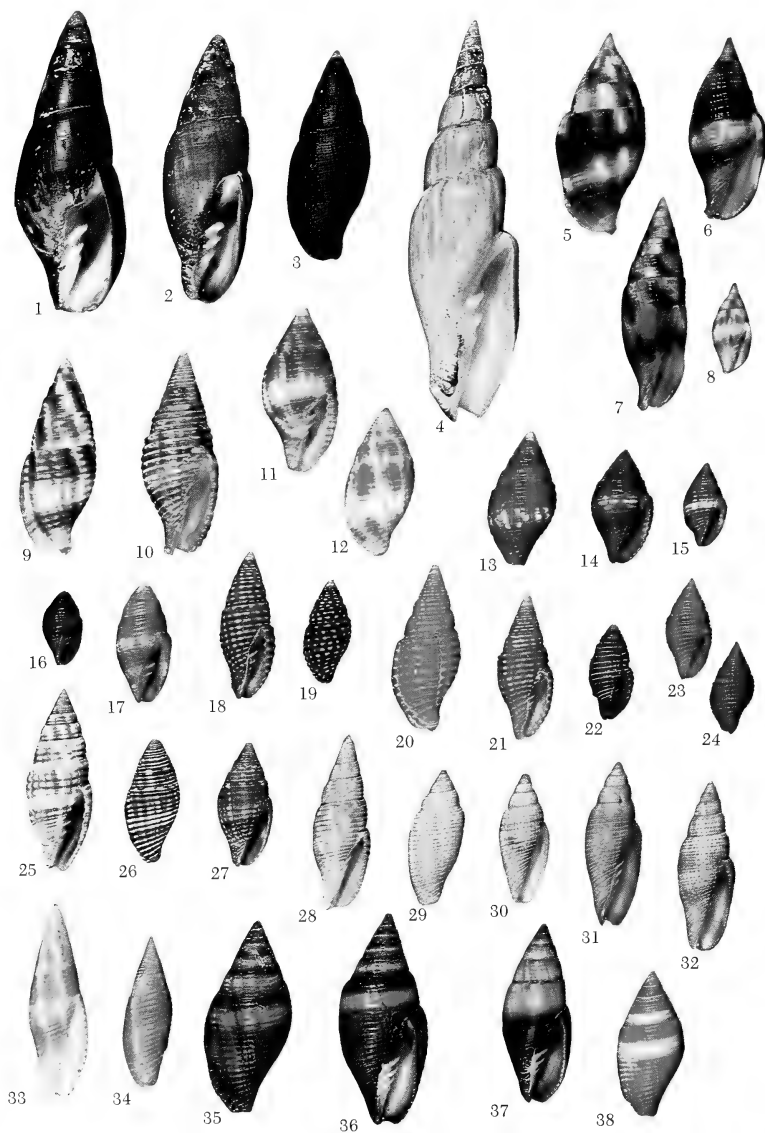


Plate 256 (explanation on opposite page)

Voluta syracusana Gmelin, 1791

Remarks—The Buonanni figure cited by Gmelin for his species has been previously cited by Linnaeus, 1758, for his *Murex pusio* and by Born, 1778, for the species *Mitra* (*Strigatella*) *paupercula* Linnaeus, 1758. The Buonanni figure is ambiguous and could possibly represent *Mitrella scripta* (Linnaeus) as suggested by Hanley, 1855.

Synonymy—

1791 *Voluta syracusana* Gmelin, *Systema naturae*, ed. 13, p. 3456 (Refers to Buonanni, 1684, vol. 3, fig. 40) (Syracus).

Mitra tahitensis Garrett, 1880

Remarks—The species has not been illustrated and the type has been destroyed in the Hamburg Museum. The description is applicable to either *Mitra ambigua* Swainson, 1829 or *M. coffea* Schubert & Wagner, 1829.

Synonymy—

1880 *Mitra tahitensis* Garrett, *Journ. of Conchology*, vol. 3, p. 30 (Tahiti, Society Islands).

Mitra vasconum Oppenheim, 1906

Remarks—The figured fragmented specimen from the Tertiary of France is a rather questionable mitrid.

Synonymy—

1906 *Mitra vasconum* Oppenheim, *Zeit. deut. geol. Gesell.*, vol. 58, p. 89, pl. 9, fig. 10 (Biarritz, Nummulitique zone, France; ? Oligocene).

Mitra ventricosa Risso, 1826

Remarks—The species has not been illustrated and is unidentifiable from the description.

Synonymy—

1826 *Mitra ventricosa* Risso, *Hist. nat. L'Europe merid.*, vol. 4, p. 246 (Subfossil; Europe).

Mitra vera Cumberland, 1826

Remarks—The species is not identifiable and may probably not even be a mitrid.

Synonymy—

1826 *Mitra vera* Cumberland, *Reliqu. conserv.*, p. 31.

Voluta virgata Gmelin, 1791

Remarks—The description itself is too brief and not very illuminating, and the cited figure from Knorr depicts a species which resembles *Mitra* (*Nebularia*) *ferruginea* Lamarck, 1811, and *M. (N.) puncticulata* Lamarck, 1811, but cannot be positively identified.

Synonymy—

1791 *Voluta virgata* Gmelin, *Systema naturae*, ed. 13, p. 3457 (Refers to Knorr, pt. 4, pl. 11, fig. 2) (Locality unknown).

Mitra vulpina Anton, 1839

Remarks—The species has not been illustrated and is unidentifiable.

Synonymy—

1839 *Mitra vulpina* Anton, *Verz. Conchylien*, p. 68 (Grobkalk, Paris Basin; Eocene).

Plate 256

Fig. 1. *Mitra orientalis* Griffith and Pidgeon. Peru, South America.

2, 3. *Mitra idae* Melvill. 5 mi. S. of Point Conception, California, 8 fms. 2, without periostracum. 3, with periostracum.

4. *Mitra swainsonii swainsonii* Broderip. Off Guaymas, Sonora, Mexico (specimen without periostracum).

5, 6. *Mitra chrysostoma* Broderip. 5, Mulinu'u, near Apia, Upolu, W. Samoa. 6, Ko Ra Dang Id., S.W. Thailand.

7. *Mitra contracta* Swainson. Boac, Marinduque Id., Philippines.

8. *Mitra coarctata* Reeve. Rarotonga, Cook Islands.

9, 10. *Mitra ferruginea* Lamarck. 9, slender form; Boac, Marinduque Id., Philippines. 10, broad form; Kailua Bay, Oahu, Hawaiian Ids., 11 fms.

11, 12. *Mitra rubritincta* Reeve. 11, Bay of Islands, Suva Harbour, Fiji Islands. 12, Nuku'alofa, Tonga Islands.

13-15. *Mitra cucumerina* Lamarck. 13, Marau Sound, Guadalcanal, Solomon Ids. 14, Phuket Id., Thailand. 15, Eilat, Gulf of Aqaba, Red Sea.

16-17. *Mitra chrysalis* Reeve. 16, forma *caledonica* Recluz; Bushmen's Bay, Malekula Id., New Hebrides. 17, Mulinu'u, near Apia, Upolu, W. Samoa.

18-21. *Mitra fraga* Quoy and Gaimard. 18, slender form; Nimitz beach, Guam Id., Marianas. 19, broad form; Marau Sound, Guadalcanal, Solomon Ids. 20, forma *rubiginea* A. Adams; Pango Point, Efate Id., New Hebrides. 21, Efate Id., New Hebrides.

22. *Mitra tabanula* Lamarck. Bay of Islands, Suva Harbour, Fiji Islands.

23, 24. *Mitra doliohum* Küster. 23, Aramot Id., Siassi Ids., New Guinea. 24, Bushmen's Bay, Malekula Id., New Hebrides.

25-27. *Mitra proscissa* Reeve. 25, Bombay, India. 26, corded form; Phuket Id., Thailand. 27, Garner's beach, Queensland, Australia.

28. *Mitra suturata* Reeve. 15 mi. W. of Anping, Taiwan.

29-32. *Mitra rosacea* Reeve. 29-30, Off Ishiki, Mikawa Prefecture, Japan. 31, Boac, Marinduque Id., Philippines. 32, Siassi, Sulu Sea, Philippines.

33, 34. *Mitra rubiginosa* Reeve. 33, Ko Pippi Id., Phuket, S.W. Thailand. 34, Boac, Marinduque Id., Philippines.

35-38. *Mitra aurantia aurantia* (Gmelin). 35, 36, Vuda Point, W. Viti Levu, Fiji Islands. 37, smooth form; Durban, Natal, South Africa. 38, Subic Bay, Luzon Id., Philippines.

Abbreviations

The following institutional abbreviations are used in this paper:

- AIM - Auckland Institute and Museum, Auckland
 AMNH - American Museum of Natural History, New York
 AMS - Australian Museum, Sydney
 ANSP - Academy of Natural Sciences of Philadelphia
 BM(NH) - British Museum (Natural History), London
 BPBM - Bernice P. Bishop Museum, Honolulu
 DMNH - Delaware Museum of Natural History, Greenville, Delaware
 IRSN - Institut Royal des Sciences Naturelles de Belgique, Brussels
 LACM - Los Angeles County Museum of Natural History
 MCZ - Museum of Comparative Zoology, Cambridge, Massachusetts
 MHNG - Muséum d'Histoire Naturelle, Geneva
 MNHP - Muséum National d'Histoire Naturelle, Paris
 MORG - Museu Oceanográfico de Rio Grande do Sul, Brazil
 NMW - National Museum of Wales, Cardiff
 SAM - South African Museum, Cape Town
 SDNHM - San Diego Natural History Museum
 TAU - Tel-Aviv University, Israel
 UCLA - University of Southern California, Los Angeles
 USNM - National Museum of Natural History, Washington, D.C.
 WAM - Western Australian Museum, Perth
 ZMB - Zoological Museum, Humboldt University, Berlin
 ZMC - Zoological Museum, Copenhagen

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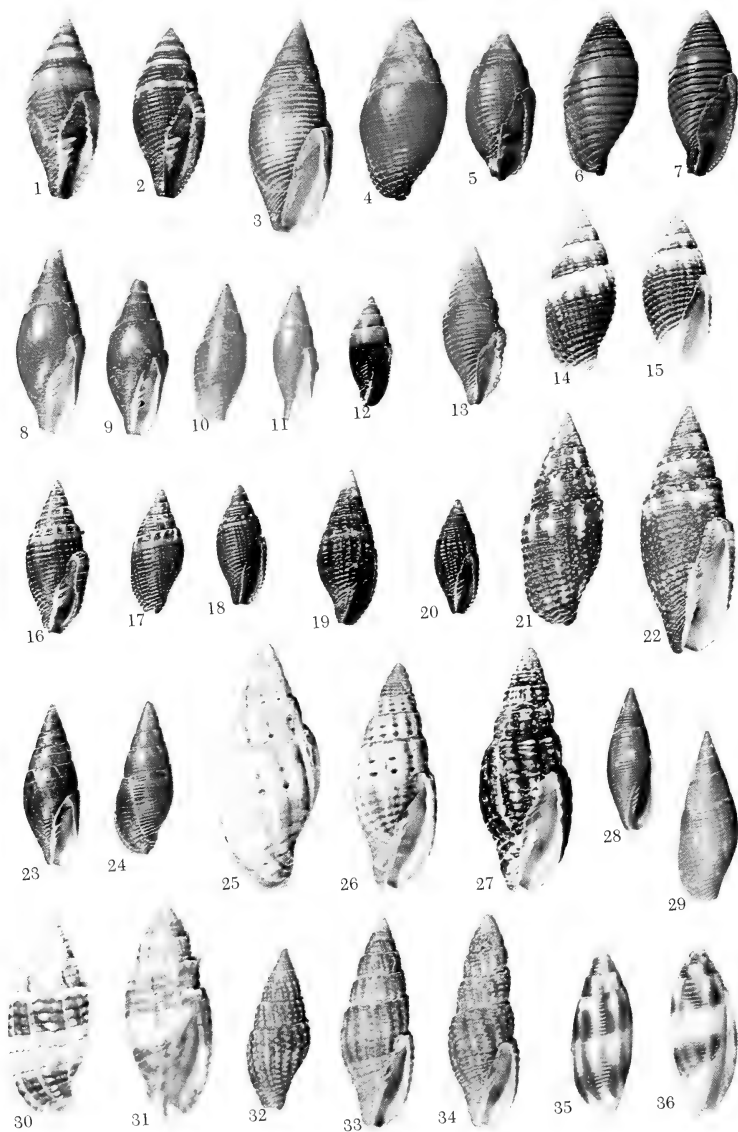


Plate 257 (explanation on opposite page)

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Plate 257

- Figs. 1, 2. *Mitra aurantia aurantia* (Gmelin). 1, Boac, Philippines. 2, forma *nanus* Reeve, Samar Id., Philippines.
3. *Mitra aurantia* subspecies *subruppelli* Finlay. Ras Jagin, Gulf of Oman.
- 4, 5. *Mitra ticaonica* Reeve. 4, Viti Levu Bay, N.E. Viti Levu, Fiji Islands. 5, slender form; Kailua Bay, Oahu, Hawaiian Ids., 10 fms.
- 6, 7. *Mitra vexillum* Reeve. 6, Boac, Marinduque Id., Philippines. 7, Marau Sound, Guadalcanal, Solomon Islands.
- 8-11. *Mitra fulvescens* Broderip. 8, 9, Kailua Bay, Oahu, Hawaiian Ids., 10 fms. 10, intermediate form; near Caltex Refinery, Batangas Bay, Philippines. 11, forma *telum* Sowerby; Pango Point, Efate Id., New Hebrides.
12. *Mitra telescopium* Reeve. Taurama beach, Port Moresby, New Guinea.
13. *Mitra ruelpelli* Reeve. Eilat, Gulf of Aqaba, Red Sea.
- 14, 15. *Mitra lugubris* Swainson. Manava Id., N. Viti Levu, Fiji Islands.
- 16-18. *Mitra coronata* Lamarck. 16, 17, Natadola, S. Viti Levu, Fiji Islands. 18, Santa Cruz, Zamboanga, Philippines.

- 19, 20. *Mitra amaura* Hervier. 19, Moturina Id., New Guinea. 20, Rat Tail Passage, Suva reef, Fiji Islands.
- 21, 22. *Mitra aurora floridula* Sowerby. 21, Meli Id., Efate Id., New Hebrides. 22, Wadigi Id., Mamanuca group, Fiji Islands.
- 23, 24. *Mitra luctuosa* A. Adams. 23, Vetschies Pier, Durban, Natal, South Africa. 24, Samarai, New Guinea.
- 25-27. *Mitra lens* (Wood). 25, 26, Vera Cruz, Panama (specimen without periostracum). 27, Panama (specimen with periostracum).
- 28, 29. *Mitra barbadensis* (Gmelin). Buccoo reef, Tobago Id., Caribbean.
- 30, 31. *Mitra punctulata* Lamarck. 30, Marau Sound, Guadalcanal, Solomon Islands. 31, Nimitz beach, Guam Id., Marianas.
- 32-34. *Mitra nodulosa* (Gmelin). 32, St. Vincent Id., Caribbean. 33, Barbados Id., Caribbean. 34, slender, turreted form; Hillborough Reef, N. of Pompano, Florida.
- 35, 36. *Mitra edentula* Swainson. 35, Pango Point, Efate Id., New Hebrides. 36, Marau Sound, Guadalcanal, Solomon Islands.

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[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

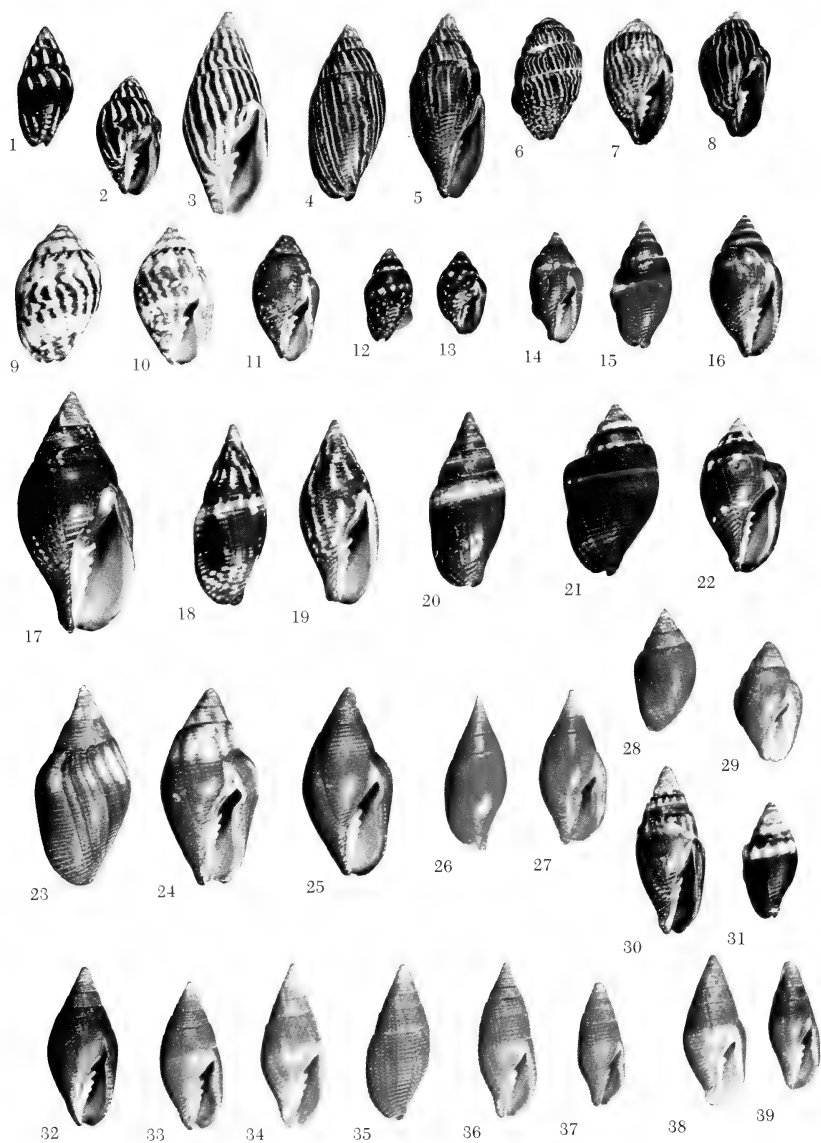


Plate 258 (explanation on opposite page)

Genus *Mitra* Lamarck, 1798

Type: *Mitra mitra* (Linnaeus, 1758)

The genus *Mitra* consists of 120 Recent and about 240 fossil species. Taxa proposed for extinct species undoubtedly contain a high percentage of synonyms in view of the numerous names proposed by Bellardi, 1887, for species forms from Mio-Pliocene deposits of Italy. Species of *Mitra* are characterized by small or large shells, reaching a length of 7 inches; they are fusiform, elongate-ovate or inflated and variable in sculpture. The protoconch is cylindrical and paucispiral and the labral wall is always smooth in Mitrinae. The proboscis of *Mitra mitra* (Linnaeus), the type species of the genus, is very long, but a shorter proboscis is frequently found in other species. Shells are covered by a thin, translucent or opaque periostracum, and an operculum is absent.

The radula ribbon is moderately small, generally 6% to 21% of shell-length, and contains from 35 to 130 rows of rachiglossate teeth; each row contains 3 teeth. The central teeth are generally rectangular, unicuspid or multicuspid and the laterals are multicuspid and two to four times the

width of the centrals. Rock-dwelling *Mitra* deposit egg-capsules on the underside of rocks in an asymmetrical cluster of 15 to 100 capsules. Egg-capsules are generally claviform and contain from 100 to 500 cream-coloured or translucent-yellow, spherical eggs.

The genus first appeared during the Early Eocene in Europe, the Caribbean, Indonesia and New Zealand. Recent species of *Mitra* live in temperate and tropical waters of all major oceans. Species of *Mitra* are predominantly rock and coral dwellers, but some species, including the type species, inhabit muddy or coralline sand. Species live in the intertidal zone and deeper water, and have been dredged to a depth of 700 fathoms; species living at these depths will tolerate a temperature as low as 45°F.

Subgenus *Mitra* Lamarck, 1798

Type: *Mitra mitra* (Linnaeus, 1758)

The shells of the genus are small or large, 5 to 170 mm in length, fusiform or elongate-ovate, smooth, or sculptured with spiral grooves, pits, granules and rarely axial ribs. Whorls are convex or angulate, the aperture is shorter or longer than the spire, the labial lip is thick or thin, simple or crenulate and dentate and the interior of the aperture is always smooth. The columella has 3 to 7 prominent, often close-set, oblique and usually parallel folds, with the exception of fossil species of the subgenus *Eumitra*. The anterior canal is short or produced, straight or recurved, and the

Plate 258

- Figs. 1-3. *Mitra paupercula* (Linnaeus). 1, off coast of Cabcaban, Luzon, Philippines. 2, Lomalagi, S. Viti Levu, Fiji Islands. 3, *forma zebra* Lamarck; Cebu Id., Philippines.
- 4, 5. *Mitra pica* (Dillwyn). 4, Mauritius. 5, Phuket Id., Thailand.
- 6-8. *Mitra retusa* Lamarck. 6, 7, Natadola, S. Viti Levu, Fiji Islands. 8, Namoui, Niue Island, Pacific.
- 9-11. *Mitra litterata* Lamarck. 9, Cuvu beach, S. Viti Levu, Fiji Islands. 10, Niue Island, Pacific Ocean. 11, Kahala, Oahu, Hawaiian Islands.
- 12, 13. *Mitra auriculoides* Reeve, *forma turturina* Souverbie. 12, Ure Id., E. coast of Malekula Id., New Hebrides. 13, Pango Point, Efate Id., New Hebrides.
- 14-16. *Mitra assimilis* Pease. 14, 15, Momi reef, W. Viti Levu, Fiji Islands. 16, broad form; Honolulu, Hawaiian Islands.
- 17-20. *Mitra scutulata* (Gmelin). 17, broad form; Vuda Point, W. Viti Levu, Fiji Islands. 18, 19, slender form; Balabac Id., Philippines. 20, form *amphorella* Lamarck, Manava Id., N. Viti Levu, Fiji Islands.
- 21, 22. *Mitra decurtata* Reeve. 21, off Kao-Hsiung, Taiwan. 22, off coast of Cabcaban, Luzon, Philippines.
- 23-25. *Mitra colombelliformis* Kiener. 23, 24, Namoui Niue Island, Pacific. 25, Naviti, Yasawa group, Fiji Islands.
- 26, 27. *Mitra acuminata* Swainson. 26, Bushmen's Bay, Malekula Id., New Hebrides. 27, Meli Id., Efate Id., New Hebrides.
- 28, 29, 32. *Mitra fastigium* Reeve. 28, 29, N. Viti Levu, Viti Levu Bay, Fiji Islands (interior tooth prominently developed). 32, Moshinga Id., off Mocimba da Praia, Mozambique, East Africa (interior tooth weakly developed).
- 30, 31. *Mitra tristis* Broderip. 30, Santa Cruz Id., Galapagos Islands. 31, Puerto Lobos, Mexico.
- 33-37. *Mitra pellisserpentis pellisserpentis* Reeve. 33, broad form; Rarotonga, Cook Islands. 34, broad, smooth form; Mauritius. 35, Rawai, Phuket, Thailand. 36, intermediate form; Ko He Id., Thailand. 37, slender form; Momi reef, W. Viti Levu, Fiji Islands.
- 38, 39. *Mitra pellisserpentis stricta* Reeve. 38, broad form; Kailua Bay, Oahu, Hawaiian Islands. 39, slender form; Honolulu, Hawaiian Islands.

siphonal notch is distinct. There are 52 living and 196 fossil species in the nominate subgenus. The subgenus is cosmopolitan in distribution.

Synonymy—

- 1784 *Mitra* Martyn, Universal Conchologist, vol. 1, pl. 19 (non binomial—work suppressed in Opinion 456 of ICZN)
 1798 *Mitra* Lamarck, Tabl. Encycl. Méth., Paris, pl. 369 (**type** by tautonymy *Voluta mitra* Linnaeus, 1758. Opinion 885 of ICZN)
 1798 *Mitra* Röding, Mus. Boltenianum, p. 135 (**type** by subsequent designation by Montfort, 1810, p. 543: *M. episcopolis* (Linnaeus) = *V. mitra* Linnaeus, 1758)
 1815 *Mitraria* Rafinesque, Analyse de la Nature, Palermo, p. 145 (**type** by virtue of art. 67 of ICZN: *Voluta episcopolis* Linnaeus is *V. mitra* Linnaeus, 1758)
 1823 *Mitrolithes* Krüger, Gesch. Urwelt, vol. 1, p. 431 (not available—art. 20 of ICZN)
 1840 *Tiarella* Swainson, Treatise Malacology, pp. 130, 131 (**type** by subsequent designation by Gray, 1847, p. 141: *Voluta papalis* Linnaeus, 1758) [also spelled *Thiarella* on p. 319—first reviser Hermannsen, 1847]
 1853 *Isara* H. & A. Adams, Gen. Rec. Mollusca, vol. 1, p. 171 (**type** by subsequent designation by Cossmann, 1899, p. 153: *Mitra bulimoides* Reeve, 1844 = *M. glabra* Swainson, 1821)
 1853 *Mutyca* H. & A. Adams, Genera of Recent Mollusca, vol. 1, p. 172 (**type** by subsequent designation by Pilsbry, 1922, p. 167: *M. ancillides* Swainson is *Mitra ancillides* Broderip, 1836)
 1864 *Mitraxia* Binney & Tryon, Compl. writ. Rafinesque, p. 19 (*nomen nullum*)
 1880 *Phaeomitra* von Martens, Beitr. Meeresf. Maurit. Seychellen, p. 252 (**type** by subsequent designation by Coan, 1966, p. 131: *Mitra (Phaeomitra) fulva* Swainson, 1829 is *Mitra coffea* Schubert & Wagner, 1829)
 1882 *Cucurbita* "Megerle MS", Scudder, Bull. U.S. Nat. Mus., No. 19, p. 93 (published in synonymy of *Mitra*)
 1895 *Eumitra* Melvill & Standen, Journ. Conchology, vol. 8, p. 99 (**type** by subsequent designation by Coan, 1966, p. 130: *Mitra (Eumitra) episcopolis* Linnaeus is *Voluta mitra* Linnaeus, 1758 [non *Eumitra* Tate, 1889])
 1900 *Fuscomitra* Pallary, Journ. de Conchyliologie, vol. 48, p.

- 263 (**type** by subsequent designation by Cox, 1936: "*Mitra fusca* Swainson"—sensu Reeve, 1844 and auct. non Swainson, 1824 is *Voluta nigra* Gmelin, 1791)
 1915 *Papalaria* Dall, Bull. U.S. Nat. Mus., no. 90, p. 60 (**type** by subsequent designation by Coan, 1966, p. 131: *Voluta episcopolis* Linnaeus is *V. mitra* Linnaeus, 1758)
 1917 *Episcomitra* Monterosato, Boll. Soc. Zool. Ital., vol. 4, p. 26 [actually privately printed] (**type** by monotypy *Mitra zonata* Swainson is *M. fusiformis zonata* Marryat, 1817)
 1918 *Atrimitra* Dall, Proc. Biol. Soc. Washington, vol. 31, p. 138 (**type** by original designation *Mitra idae* Melvill, 1893)
 1929 *Vicimitra* Iredale, Australian Zoologist, vol. 5, p. 343 (**type** by monotypy *V. prosphora* Iredale, 1929 is *Mitra solida* Reeve, 1844)
 1956 *Cryptomitra* "Dall MS", Bryan, Hawaiian Shell News, vol. 4, No. 4, p. 39 (*nomen nudum*)
 1966 *Volvariella* Coan, Veliger, vol. 9, p. 132 (**type** by original designation *Mitra lamarckii* Deshayes, 1832) [non *Volvariella* Fischer, 1883]

Nomenclature—The genus-group name *Mitra* was proposed by Lamarck and Röding in the same year, i.e. 1798, and the authorship has consequently been credited to either one of the two authors. The authorship of *Mitra* has been clarified by the International Commission on Zoological Nomenclature in Opinion 885, Bull. Zool. Nomencl., vol. 26, p. 125, where the Commission instructs that Lamarck be credited with the authorship of *Mitra*. Introduced in 1798, the genus name *Mitra* did not come into general use until 1811 with the appearance of Lamarck's monograph on the Mitridae (Ann. Hist. Nat. Paris, vol. 17, pp. 195-222). Prior to 1798, Mitridae species were included in the genus *Voluta* by Linnaeus, 1758 and 1767, Born 1778 and 1780 and Gmelin, 1791.

***Mitra mitra* (Linnaeus, 1758)**

(Color pl. 253, fig. 1; pl. 250)

Range—East Africa to Polynesia and Hawaii, Galapagos Islands.

Remarks—This widely distributed and common species is one of the largest of the genus, reaching almost 7 inches in length. The animal has a very long, slender proboscis, and after capture and during desiccation, discharges a purple-brown fluid which is harmless to humans but has considerable staining properties. Large specimens of *M. mitra* are still occasionally used by Pacific Island natives as a chiselling tool during boat construction and house building.

Habitat—The species lives in coralline and silty sand, from the intertidal zone to a depth of 33 fathoms. During the day, the animal is usually buried in sand but becomes semi-active at the turn of the tide and leaves large tracks in the sand when on the move with a partial covering of sand. The animal is most active at night when it crawls upon the sand substrate in search for food.

Description—Shell reaching 170 mm (about 7 inches) in length, elongate-fusiform, heavy and solid, sutures moderately impressed. Whorls 9 or 10 inclusive of protoconch, spire whorls convex and rounded at sutures. Early postnuclear whorls with 5-8 finely punctate spiral lines, last 2-3 whorls generally smooth. Aperture about equal in height to the spire, widening basally, smooth within; outer lip almost perpendicular, thickened at the margin and with distinct, thorn-like denticles anteriorly in adult specimens. Columella heavily calloused and with 4-5 prominent folds; anterior canal with a prominent folded callus and oblique spiral cords, siphonal notch distinct. White or cream in colour, ornamented with 5-9 transverse rows of irregular but generally squarish

or rhomboidal, bright orange spots on the body whorl and 2 or 3 rows of spots on earlier whorls. Periostracum brown and moderately opaque.

Juvenile specimens less than 40 mm in length are short and obese with the aperture longer than the spire, a prominent punctate spiral sculpture on the body whorls and distinct spiral cords on early whorls. The aperture is bow-shaped and the outer lip thin and without denticles.

Measurements (mm.)—

length	width	height of aperture	
138.0	41.0	67.0	Malolo I., Fiji Ids.
124.0	37.0	62.0	Wakaya I., Fiji Ids.
91.0	30.0	49.0	Palawan I., Philippines
66.0	22.0	38.0	Solomon Ids.
71.6	22.5	36.9	Lectotype of <i>mitra</i> Linnaeus
52.0	17.0	27.0	Guam I., Marianas
15.0	6.5	9.0	(immature) Niihau I., Hawaii

Synonymy—

- 1758 *Voluta mitra* Linnaeus, Systema Naturae, ed. 10, p. 732 (O. Asiatic); 1955 Dodge, Bull. Americ. Mus. Nat. History, vol. 107, p. 121; 1969 Cernohorsky, Zool. Journ. Linn. Soc. London, vol. 48, p. 356, pl. 2, fig. A (figured lectotype).
 1758 *Voluta mitra episcopalis* Linnaeus, Systema Naturae, ed. 10, p. 732 (name suppressed by ICZN in Opinion 885, 1969).
 1798 *Mitra carmelita* Roding, Museum Boltenianum, p. 136 (substitute name for *Voluta episcopalis* Gmelin, 1791).
 1833 *Mitra episcopalis* Linnaeus, Quoy & Gaimard, Voyage l'Astrolabe, vol. 2, p. 634, pl. 45 figs. 1-7 (animal and anatomy); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 3, pl. 1, fig. 1; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 1, fig. 5; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 2, pl. 1, fig. 3.
 1923 *Mitra mitra* Linnaeus, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 88; 1936 Hirase, Coll. Japanese Shells, ed. 5, p. 70, pl. 100, fig. 13; 1946 Kira, Venus, vol. 14, pp. 219-288; 1959 Kira, Colored Illustrations Shells Japan, vol. 1, p. 89, pl. 34, fig. 16; 1965 Cernohorsky, Veliger, vol. 8, p. 91, pl. 13, fig. 1; 1966 Cernohorsky, Veliger, vol. 9, p. 105, figs. 2a, b (radula and penis).

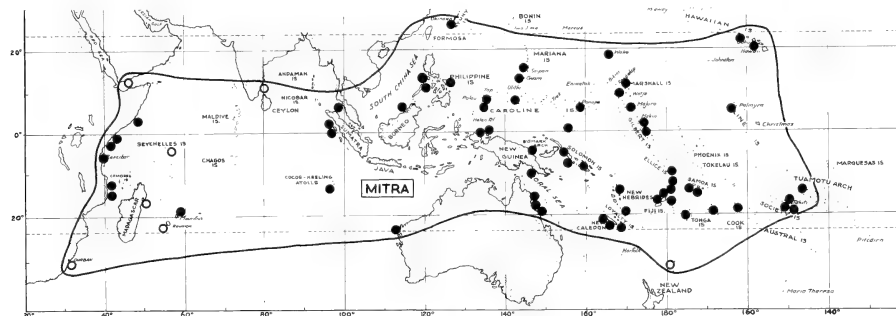


Plate 259. Geographical distribution of *Mitra (Mitra) mitra* (Linnaeus).

Types—The lectotype of *M. mitra* is in the collection of the Linnean Society, London. The type locality is Asiatic Ocean, and is here restricted to Ceram Island, Moluccas, Indonesia, according to Rumphius' first correct locality indication.

Nomenclature—During the 19th century the specific name *Mitra episcopalis* was almost exclusively used for this species. In 1923 Dautzenberg & Bouge re-instated *M. mitra* into malacological literature and the name has remained in use ever since. Coan (1966, Bull. Zool. Nomenclature, vol. 22, p. 355) petitioned the International Commission on Zoological Nomenclature for a retention of *Mitra episcopalis* and a suppression of *M. mitra*. In 1969, in Opinion 885, (Bull. Zool. Nomencl., vol. 26, p. 125), the Commission gave a reversed ruling, and suppressed *Voluta episcopalis* Linnaeus, and added *V. mitra* to the Official List of Specific Names in Zoology.

Records—GULF OF ADEN: Steamer Point, Aden (Shopland, 1902). EAST AFRICA: Mogadiscio, Somalia; 4 mi. SE of Gedi, Kilifi, Kenya; Malindi, N. of Mombasa, Kenya; Port Mombaque, Mozambique (all USNM); Porto Amelia, Mozambique (AMNH); Twiga Beach hotel, 16 mi. S. of Mombasa Kenya (Steiner coll.). ZANZIBAR: (USNM). SOUTH AFRICA: Durban (E. A. Smith, 1903). INDIAN OCEAN ISLANDS: Madagascar (Dautzenberg, 1910); Reunion I. (Deshayes, 1863); Seychelles I. (von Martens, 1880); Mauritius (USNM; AIM); Cocos-Keeling I. (USNM). INDIA: Madras (Melville & Standen, 1898). THAILAND: Goh Similan I. (USNM). INDONESIA: Pulau Melila, off Sumatra; Paula Bai, Batu group, off Sumatra; Mandi Darrah I. (all USNM). PHILIPPINE ISLANDS: Lubang I., Mindoro (USNM); Cuyo I., Palawan group (USNM; AIM); Borongan village, Samar (AMNH). CHINA: Whampoa (USNM). RYUKYU ISLANDS: Okinawa I. (USNM). MARIANAS: Agat Bay, Alutot I. (AIM); Guam I. (USNM; AMNH); Saipan I. (USNM). PALAU ISLANDS: SE side of Urukthapel I. (USNM); Toagel Passage (AMNH). CAROLINE ISLANDS: Falaui I., S end of Ilukal Atoll; Kapingamarangi I. (both USNM); Ponape I. (AMNH). MARSHALL ISLANDS: Ailuk Atoll (USNM); Majuro Atoll (USNM; AMNH); Kwajalein I. (AMNH). WAKE ISLAND: (USNM). NEW GUINEA: Biak I., Schouten Ids. (USNM); SW of Biak wharf (Powell coll.); mouth of Ramu River (AIM); Port Moresby (Kleckham coll.). AUSTRALIA: SW of Point Cloates, West Australia (WAM); Cooktown, Queensland (USNM); Green I., off Cairns, Queensland (USNM); Hope I., Queensland (Powell coll.). KERMADEC ISLANDS: (Iredale, 1910). SOLOMON ISLANDS: Buka I., Bougainville I.; Treasury I. (both AIM); Honiara, Guadalcanal; Tulagi (both DMNH). NEW HEBRIDES: NE coast of Santa Maria I., Banks group; Port Stanley, Malekula I. (both USNM); Malapoa Point, Vila harbour, Efate I., Erakor lagoon, SW Efate I. (both AIM). NEW CALEDONIA: E end of Ouakue Bay, 10-20 ft. (USNM); Plage de Poc, Bourail (AIM). LOYALTY ISLANDS: E end of Beaufort-Beaupre Atoll, 10-20 ft. (USNM). GILBERT ISLANDS: Abaia I. (USNM); Betio-Bairaki causeway, Tarawa I. (Holmes coll.); Bikenebiu, Tarawa I. (Cernohorsky coll.). ELLICE ISLANDS: Nukulaia I. (USNM). WALLIS & FUTUNA ISLANDS: Nukuhifala, Wallis I.; Anse de Sigave, Huon I. (both USNM). FIJI ISLANDS: Malolo I., Mamamua group; Lomalagi, S. Viti Levu; Manava I., N. Viti Levu (all Cernohorsky coll.); Wakaya I. near Ovalau I. (AIM). TONGA ISLANDS: Pangaimotu reef, Tongatabu I. (USNM); Nuku'alofa, Tongatabu I. (Gay coll.). SAMOA ISLANDS: Amouli Tutila I. (Harvard-Archbold Exped.); Cape Fatuosofa, Upolu I. (AIM); Apia, Upolu I. (Jackson coll.); Lalomafua, Savaii I. (DMNH). NIUE ISLAND: (McDowall coll.). COOK ISLANDS: Tom's I., Palmerston Atoll (USNM). SOCIETY

ISLANDS: Mitirapa, Tahiti, S tip of Motu Pahare, Huahine I.; SE side of Motu Iriru, Raiatea I.; W of Point Hauru, Moorea (all USNM); Makatea I. (DMNH). TUAMOTU ISLANDS: Rangiroa Atoll (USNM). LINE ISLANDS: Palmyra I. (USNM). HAWAIIAN ISLANDS: off Waikiki, Oahu, 25-33 faths. (USNM); Nihoa I. (AIM); Nanakuli, Oahu I. (DMNH). EASTERN PACIFIC: Galapagos Islands, dredged deep by J. DeRoy. COSTA RICA: dredged live, offshore. (fide G. G. Sphon, the Nautilus, in press).

Mitra papalis (Linnaeus, 1758)

(Color pl. 253, fig. 2)

Range—From East Africa to Polynesia.

Remarks—This uncommon species has a shell similar to *M. stictica* (Link), but is larger, the sutures are more adpressed, the sutural coronations are wider apart and less erect, the spots are smaller, more numerous and crimson-red and the deep punctations are lacking on the body whorl.

Habitat—In clean coral sand and among coral rubble, from 1 to 16 fathoms.

Description—Shell up to 160 mm (about 6½ inches) in length, elongate-ovate, solid and heavy. Whorls 8-9, apart from 2 smooth and white nuclear whorls, spire whorls slightly subangulate; post-nuclear whorls with 3-4 punctate spiral grooves which become weak on the penultimate and obsolete or absent on the body whorl. Sutures adpressed, coronations not erect but following the contours of the sutures. Aperture moderately wide, equal in height or longer than the spire, smooth within; outer lip thickened, perpendicular and crenate with small sharp denticles. Columella calloused and with 4-6 prominent, oblique folds, siphonal canal straight, obliquely corded and calloused, siphonal notch prominent. White in colour, ornamented with 3-4 spiral rows of moderately small, quadrate, rhomboidal or triangular, crimson-red spots on the penultimate and 15-20 rows on the body whorl; interior of aperture cream or light yellow in colour.

Measurements (mm)—

length	width	height of aperture	
162.0	—	—	Capul I., Philippines
104.0	34.0	—	Okinawa I.
99.0	41.0	54.0	Manava I., Fiji Ids.
90.0	33.5	52.5	Efate I., New Hebrides

Synonymy—

1758 *Voluta mitra papalis* Linnaeus, Systema Naturae, ed. 10, p. 732 (reference to Buonanni, 1684, pl. 119, = lectotype figures) [O. Asiaticol]; 1767 Linnaeus, Systema Naturae, ed. 12, p. 1194; 1953 Dodge, Bull. Americ. Mus. Nat. History, vol. 107, art. 1, p. 121; 1969 Cernohorsky, Zool. Journ. Linn. Soc. London, Zool., vol. 48, p. 356.
1811 *Mitra papalis* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 197; 1838 Kiener, Species générale iconographie coquilles vivantes, vol. 3, p. 8, pl. 2, figs. 3, 3a; 1844 Reeve, Conchologia Iconica, pl. 2, fig. 9; 1874 Sowerby, Thesaurus

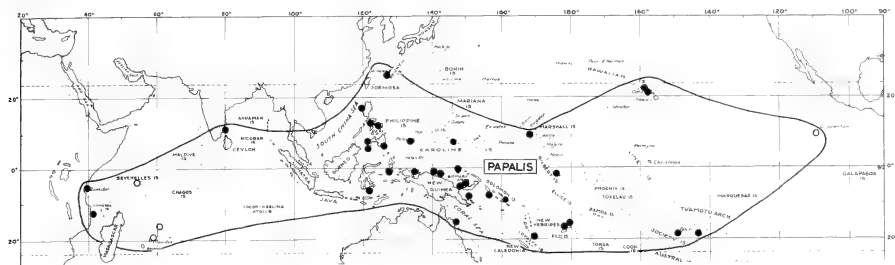


Plate 260. Geographical distribution of *Mitra (Mitra) papalis* (Linnaeus).

Conchyliorum, vol. 4, p. 2, pl. 1, figs. 6, 7; 1920 Cooke, Proc. Zool. Soc. London, p. 408, fig. 2 (radula); 1935 Dautzenberg, Mem. Mus. d'Hist. Nat. Belg., vol. 2, p. 49, pl. 2, fig. 7; 1959 Kira, Coloured Illustrations Shells of Japan, ed. 2, vol. 1, p. 89, pl. 34, fig. 15; 1965 Cernohorsky, Veliger, vol. 8, p. 93, pl. 14, fig. 17; 1967 Cross, Hawaiian Shell News, vol. 15, no. 4, p. 7, fig. 1 (animal).

Types—The type of *M. papalis* (Linnaeus), is not in the Linnean collection of the Linnean Society, London. Cernohorsky (1969) designated the Buonanni figures on plate 119 as the figured lectotype of the species. The original locality of O. Asiatico is correct and the type locality is further restricted to Ceram Island, Moluccas, Indonesia, as indicated by Rumphius.

Records—EAST AFRICA: Porto Amelia, Mozambique (AMNH). ZANZIBAR: (USNM; AMNH). INDIAN OCEAN ISLANDS: Mauritius (Viader, 1937); Seychelles Islands; Cargados Islands (both von Martens, 1880). INDIA: Pambam Island (Steiner coll.). INDONESIA: Tiger I., Celebes (IRSN); Borneo I., Moluccas (Harvard-Archbold Exped.). PHILIPPINE ISLANDS: Jolo, Siasi (USNM); Boac, Marinduque (Alexander coll.); Cebu I.; Leyte I.; Barongan, Samar I. (all DMNH); small cove at Magalawa I., Zambales (Clover coll.); Capul I., NW Samar; Zamboanga, Jolo; Davao, Mindanao (all Deynzer coll.). RYUKYU ISLANDS: (USNM); Okinawa Island (USNM). PALAU ISLANDS: (USNM). CAROLINE ISLANDS: Losap, Mortlocks (DMNH). MARSHALL ISLANDS: Kwajalein Island (AMNH). NEW GUINEA: Biak I., Schouten Ids.; NW reefs at Seles I., Aitape; near Hollandia (all USNM); Woodlark I., Milne Bay (Kleckham coll.); New Britain Island; Trobriand Islands (both Hinton coll.). ADMIRALTY ISLANDS: Manus Island (Hinton coll.). AUSTRALIA: off Cooktown, Queensland (Cernohorsky coll.). SOLOMON ISLANDS: Roviana, New Georgia I. (K. & A. McCollim coll.). NEW HEBRIDES: Efate Island (Allan coll.); Mele I., SW Efate I., 2 faths. (Cernohorsky coll.). SOLOMON ISLANDS: Malaita. (DMNH). FIJI ISLANDS: Manava I., N Viti Levu (Cernohorsky coll.); off Lautoka, W Viti Levu (Mjts coll.). KINGSMILL ISLANDS: (USNM); SOCIETY ISLANDS: Tahiti (AMNH). TUAMOTU ISLANDS: Anaa Island (AMNH). HAWAIIAN ISLANDS: Kahala, Oahu I., 12 faths. (DMNH). Between Keelhi Buoys, Oahu (BPBM); Makua, Oahu, 11 faths. (AMNH); off Makua, Oahu, 5 faths. (Clover coll.). CLIPPERTON ISLANDS: (Hertlein & Hanna, 1960).

Mitra stictica (Link, 1807)

(Color pl. 253, figs. 3, 4; pl. 261)

Range—East Africa to Polynesia.

Remarks—This rather common species has been confused with *M. papalis* by 18th century authors; besides the distinct morphological differences between the two species, *M. papalis* is a sand-dweller, whereas *M. stictica* lives on coral reef platforms.

Habitat—On reef platforms, on the underside of rocks and in coral crevices, generally on a hard reef substratum, from the intertidal zone to a depth of 100 fathoms.

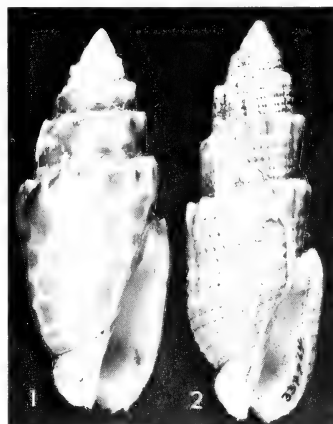


Plate 261. *Mitra (Mitra) stictica* (Link).

Fig. 1. Specimen from Motu Iriru, Raiatea, Society Ids.; broad, smooth form with long aperture (USNM 675374; 46.4 mm).

Fig. 2. Specimen from Keokea, Hilo, Hawaiian Ids.; slender, sculptured form with short aperture (USNM 337964; 52.0 mm).

Description—Shell up to 75 mm (about 3 inches) in length, similar to *M. papalis* in form, sutures prominent, whorls flat-sided, numbering from 8-10 inclusive of the protoconch. Post-nuclear whorls with 2-3 spiral rows of deep pits, penultimate and last whorls generally smooth; some individuals, however, are prominently sculptured with spiral rows of pits on all whorls. Coronations at sutures are close-set and prominent. Aperture shorter or longer than the spire, smooth within; outer lip thickened and with small, sharp denticles at the margin. Columella calloused and with 4-5 distinct and oblique folds. Siphonal canal straight, heavily calloused, siphonal notch prominent. White in colour, ornamented with 4-7 bright orange or vermillion, rhomboidal and closely spaced blotches which are generally largest near the sutures; early whorls have 2-3 rows of coalescing spots; aperture light yellow within, columella creamy-white.

Measurements (mm)—

length	width	height of aperture	
75.0	25.0	33.0	Rarotonga, Cook Ids.
69.0	26.0	35.0	Ovalau I., Fiji Ids.
59.0	22.0	31.0	Utuko, Niue I.
46.0	17.0	23.0	Cook I.
30.0	12.0	15.5	Niihau I., Hawaiian Ids.

Synonymy—

- 1798 *Mitra cardinalis* Röding, Museum Boltenianum, p. 135 (refers to Chemnitz, vol. 4, figs. 1355, 1356) [non *Voluta cardinalis* Gmelin, 1791]; 1966 Cernohorsky, Journal of Conchology, vol. 26, p. 92.
- 1807 *Voluta stictica* Link, Besch. Nat.-Samml. Univ. Rostock, p. 127 (refers to Chemnitz, vol. 4, fig. 1356; here designated as the lectotype); 1968 Cernohorsky, Journal of Conchology, vol. 26, p. 215.
- 1811 *Mitra abbatis* Perry, Conchology, pl. 39, figs. 2, 3.
- 1811 *Mitra pontificalis* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 198 (Indian Ocean); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 7, pl. 1, fig. 2; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 4, fig. 23; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 2, pl. 1, figs. 1, 2;

- 1935 Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 53, pl. 2, fig. 8; 1969 Cernohorsky, Revue Suisse de Zoologie, vol. 76, p. 955, pl. 1, fig. 1 (figured lectotype).
- 1817 *Mitra coronata* Schumacher, Essai nouv. système, p. 239 (refers to Chemnitz, vol. 4, figs. 1355, 1356) [non Lamarck, 1811].
- 1817 *Voluta thiara* "Solander MSS", Dillwyn, Descrip. cat. recent shells, vol. 1, p. 561 (refers to Lister, pl. 840, fig. 68; Tabl. Encycl. Méth., pl. 370, fig. 2, etc.) [Madagascar].
- 1934 *Mitra stictica* (sic) Hirase, Coll. Shells of Japan, p. 70, pl. 100, fig. 12.
- 1935 *Mitra pontificalis* var. *confluens* Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 55, pl. 2, fig. 9.
- 1954 *Mitra stictica* (Link), Kira, Colored Illust. Shells of Japan, vol. 1, pl. 34, fig. 14; 1965 Cernohorsky, Veliger, vol. 8, p. 98, pl. 14, fig. 15; 1966 Cernohorsky, Veliger, vol. 9, p. 106, fig. 7 (radula).
- 1962 *Mitra stricta* Kira, Shells Western Pacific Color, vol. 1, p. 99, pl. 35, fig. 14 (nomen nudum).
- 1967 *Mitra (Tiarella) cardinalis* (Röding), Habe & Kosuge, Standard Book Japanese Shells in Color, vol. 3, p. 86, pl. 33, fig. 28 (non *Voluta cardinalis* Gmelin, 1791).

Types—The types of *M. stictica* are no longer extant at the Zoological Institute of Rostock, although part of the collection described by Link is still there. We therefore designate figure 1356 on plate 147 in Chemnitz, 1780, as the lectotype of *M. stictica* (Link). The types of *M. pontificalis* Lamarck, are in the Museum d'Histoire Naturelle, Geneva, and the type of Dautzenberg's variety *confluens* is in the Institut Royal Sciences Naturelles, Brussels. The types of *M. abbatis* Perry, and *M. thiara* (Dillwyn) are lost. No locality was cited by Link, and the locality given by Chemnitz for the specimen figured by him was Batavia, and Batavia (= Djakarta), Java, Indonesia, is designated as the type locality.

Nomenclature—Habe & Kosuge (1967) applied Röding's name *M. cardinalis* to the *stictica* of Link and of authors, but Röding's taxon is here considered a secondary homonym of *Voluta cardinalis* Gmelin, 1791.

Records—EAST AFRICA: Mogadiscio, Somalia; Dar-es-Salaam, Tanganyika (DMNH); near Porto Amelia, Mozam-

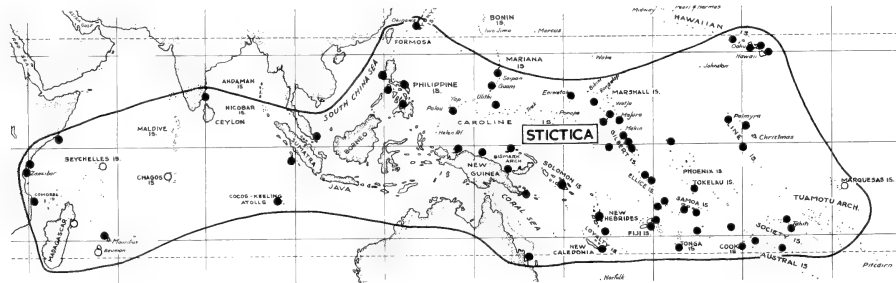


Plate 262. Geographical distribution of *Mitra (Mitra) stictica* (Link).

bique (both USNM); Twiga beach hotel, 16 mi. S of Mombasa, Kenya (Steiner coll.). ZANZIBAR: (AMNH); Bawe Island (USNM). INDIAN OCEAN ISLANDS: Madagascar (Dautzenberg, 1910); Reunion Island (Deshayes, 1863); Mauritius (USNM); Seychelles Islands (Dautzenberg, 1935); reef off Possession Point, Horsburgh I., Cocos-Keeling Ids. (USNM). INDIA: Pamban Island (Steiner coll.). MALAYSIA: Singapore (Powell coll.). INDONESIA: Pulau Stupai Mentawai I. off Sumatra (USNM). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.); Luzon I., Samar I., Cebu I., Marinduque I. (all DMNH); Caba I., Mindoro (USNM). RYUKYU ISLANDS: (USNM); Kadena, Okinawa I. (AMNH); Kadena Circle, Okinawa I. (USNM). MARIANAS: Guam Island; Unai Fananhuayan, Saipan I. (both USNM). PALAU ISLANDS: Kayangel Island (USNM). CAROLINE ISLANDS: Kusaie Island; Ifalik Atoll (both USNM). MARSHALL ISLANDS: Majuro (DMNH); Rujoru I., Eniwetok Atoll; Ebeye I., Kwajalein Atoll; W side of Pinglap I., Jaluit Atoll (all USNM); Arno Atoll (AMNH). NEW GUINEA: Samarai Island (Kleckham coll.); Celeo I., 5 mi. off Aitape (USNM); Mios Woendi I., Padoia Ids. (USNM; AIM); near mouth of Ramu River (AIM). ADMIRALTY ISLANDS: Los Negros Island (USNM). SOLOMON ISLANDS: Malaita I. (DMNH). AUSTRALIA: Lady Musgrave I., Bunker group, Queensland (AIM). NEW HEBRIDES: Anietyum I. (DMNH) Pango reef, Efate Island (AIM). LOYALTY ISLANDS: Lifu Island (Melville & Standen, 1895). GILBERT ISLANDS: Abemama Island (USNM); Onotoa Atoll (Powell coll. and DMNH); Betio-Bairaki causeway, Tarawa I. (Holmes coll.); Bikenebiu, Tarawa I. (Cernohorsky coll.). ELLICE ISLANDS: Vaitupu Island; N. Motu, Nukulaelae (both USNM). KINGSMILL ISLANDS: Ocean Island (AIM); Kingsmill Island (USNM). WALLIS & FUTUNA ISLANDS: E coast of Faioa I., Wallis I.; Sigave Bay, Hoom I., Futuna I. (both USNM). HOWLAND & BAKER ISLANDS: Baker Island (USNM). PHOENIX ISLANDS: Swains Island (USNM). FIJI ISLANDS: Leleuvia I., near Ovalau I. (Cernohorsky coll.); Cuvu beach, S. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: Nuku alofa, Tongatabu I. (Gay coll.). SAMOA ISLANDS: Tutuila Island; Falealupo, Savaii I. (both USNM). NIUE ISLAND: Utukou (McDowall coll.). COOK ISLANDS: Tupapa lagoon, Rarotonga I.; Mauke Island; Tom's I., Palmerston Atoll; Ayatu Harbour, Rarotonga I. (all USNM). AUSTRAL ISLANDS: Moerai Bay, Rurutu I. (USNM). SOCIETY ISLANDS: Tahaa I. (DMNH); NW side of Motu Iriru, Raiatea I.; Taone reef, Tahiti (both USNM). MARQUESAS ISLANDS: (Garrett, 1880). LINE ISLANDS: Palmyra (USNM); Fanning I.; Jarvis I. (both DMNH). HAWAIIAN ISLANDS: Keokea, Hilo I.; Honokowai reef, Maui (both USNM); Niihau Island (AIM); off Keehi lagoon, Oahu, 100 fathoms (Cross coll.); Kailua Bay, Oahu I. 9 faths., gravelly sand; Makua, Oahu I., 9 faths. (both DMNH); Kauai I., (MCZ).

Mitra bovei Kiener, 1838

(Color pl. 253, figs. 9, 10; pl. 263)

Range—Gulf of Aqaba, Red Sea, to the Persian Gulf and western India.

Habitat—From the intertidal zone to a depth of 15 fathoms, on sand and rock substratum. Uncommon.

Description—Shell up to 60 mm (about 2½ inches) in length, elongate-ovate, solid, sutures distinct and adpressed on last whorl. Whorls 7-8, apart from white, cylindrical nuclear whorls, spire whorls flat-sided or slightly convex. Post-nuclear whorls with 4 or 5 axially lirate spiral grooves, penultimate whorl with 4-7 grooves and body whorl with 12-20 distant and fairly regularly spaced, fine striae and 6-10 oblique cords at the

base. Sutures with either prominent or almost obsolete, axially oriented crenulations and occasionally with axial lirae extending over 1 or 2 presutural spiral grooves. Aperture narrow and elongate, longer than the spire, smooth and greenish-brown or purplish brown within; outer lip thickened and bluntly crenulate, parietal wall brown, lower part of columella white and calloused and with 4 or 5 prominent folds. Siphonal canal straight and slightly calloused, siphonal notch distinct. Variable in colour, generally off-white, ornamented with irregular and often rhomboidal small spots and 2 broad, interrupted greenish brown transverse bands and occasionally orange-brown spiral lines. Periostracum thin, translucent and brown in colour.

Measurements (mm)—

length	width	height of aperture	
58.0	19.0	—	Holotype of <i>bovei</i>
35.0	13.4	19.0	Eilat, Gulf of Aqaba
34.0	12.8	20.0	Tarut Bay, Persian Gulf
23.5	10.7	14.9	Holotype of <i>abacophora</i>

Synonymy—

1838 *Mitra bovei* Kiener, *Spécies général iconographie coquilles vivantes*, vol. 3, p. 9, pl. 2, fig. 5 (Red Sea); 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 11, fig. 78; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 2, pl. 5, fig. 60; 1920 Cooke, *Proc. Zool. Soc. London*, p. 416, fig. 15 (radula). 1888 *Mitra abacophora* Melville, *Journal of Conchology*, vol. 5, p. 286, pl. 2, fig. 22 (no locality given).

Types—The holotype of *M. bovei* Kiener, is in the Muséum National d'Histoire Naturelle, Paris,

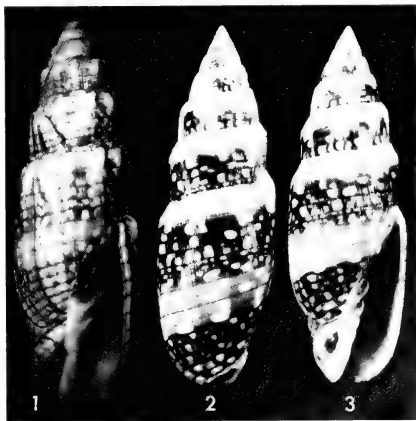


Plate 263. *Mitra (Mitra) bovei* Kiener.

Fig. 1. Holotype from the Red Sea (MHNP; 58.0 x 19.0 mm) [photo courtesy of E. Fisher-Piette, MHNPI].

and the worn and faded holotype of *M. abacophora* Melvill, is in the National Museum of Wales, Cardiff. The type of the latter species has also part of the apex missing and the sutural crenulations are only barely distinguishable. The type locality for *M. bovei* is the Red Sea.

Records—RED SEA: Eilat, Gulf of Aqaba (K. Haim coll.; A. Hadar coll.); Suez (MCZ); Jiddah (AMNH); Jubal Island, 5 faths (Cooke, 1885); Massawa (Jickeli, 1874); Dahlak Island, 5-10 m (Clover coll.; Cernohorsky coll.). GULF OF ADEN: Aden (Shopland, 1902); Maskali, French Somalia (Deynzer coll.; Cernohorsky coll.). PERSIAN GULF: Bas Tanura, Tarut Bay (USNM; DMNH; Powell coll.); Kuwait (DMNH); Zaal Island (USNM); near Lingeh, 10 faths. (Melvill & Standen, 1901). INDIA: Bombay Harbour (Melvill & Abercrombie, 1893).

Mitra cardinalis (Gmelin, 1791)

(Color pl. 253, figs. 5, 6)

Range—Madagascar to Polynesia.

Remarks—This species is easily recognized by its ovate and plump form, spiral rows of brick-red, quadrate spots, punctate spiral grooves, close-set axial striae and small, brown-spotted denticles on the outer lip. A living specimen is depicted on color plate 254.

Mitra lamarckii (Deshayes, 1832) from the Hawaiian Islands, has been considered by some authors to be a form of *M. cardinalis*, but the former species is closely related and a subspecies of *M. nubila* (Gmelin, 1791).

Habitat—On reefs, under coral rocks generally on a hard reef substratum but occasionally partly covered with a thin layer of sand, within the intertidal zone.

Description—Shell up to 70 mm (about 3 inches) in length, elongate-ovate, solid, plump and heavy. Sutures moderately impressed, whorls convex and rounded at sutures, numbering from

8-10 inclusive of the protoconch which consists of 1-2 white and glassy nuclear whorls. Post-nuclear whorls with 3 spiral striae, penultimate whorl with 8-10 and last whorl with 22-30 spirals; spiral grooves are distinctly punctate on the body whorl but prominently axially lirate on the spire whorls. The axial lirae become less prominent on the centre of the last whorl. Aperture longer than the spire, slightly widening basally, smooth within; outer lip thickened, convex, and with about 20 small, brown-spotted denticles. Columella calloused anteriorly, forming a small shield in adult specimens, and with 4 or 5 prominent, oblique folds. Anterior canal short, with a moderate callus and 6-10 close-set, oblique cords, siphonal notch distinct. White in colour, ornamented with 3 or 4 spiral rows of irregular, rectangular or quadrate brick-red spots on the penultimate whorl and 10-15 rows on the last whorl; these spots may merge and form large blotches, especially on the spire whorls. Interior of aperture flesh or light yellow. Columella creamy-white.

Measurements (mm)—

length	width	height of aperture	
70.0	30.0	43.0	Leleuvia I., Fiji Ids.
51.0	22.0	34.0	Bougainville, Solomon Ids.
43.0	19.0	27.0	Malekula I., New Hebrides

Synonymy—

1780 *Voluta pertusa* Born, Test. Mus. Caes. Vindobonensis, p. 228, pl. 9, figs. 11, 12; 1817 Dillwyn, Descrip. cat. recent shells, vol. 1, p. 558 (non Linnaeus, 1758).

1781 *Voluta cardinalis* Gronovius, Zoophyl. Gronovianum, vol. 3, p. 299 (non binomial).

1784 *Mitra vermiculosa* Martyn, Universal Conchologist, vol. 3, pl. 105, lower figure (*non binomial*); 1935 Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 56 (validated Martyn's taxon).

1791 *Voluta cardinalis* Gmelin, Systema Naturae, ed. 13, p. 3458 (refers to Lister, pl. 838, fig. 65; here designated as the lectotype); 1967 Cernohorsky, Journal of Conchology, vol. 26, p. 171.

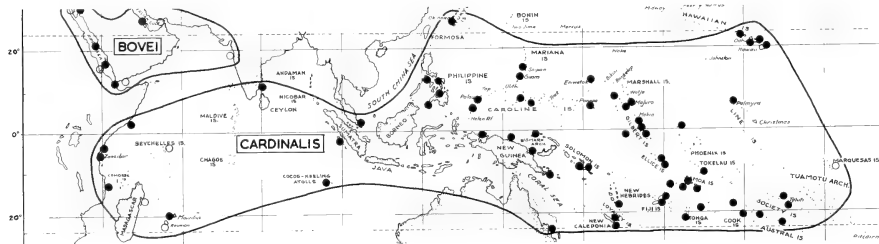


Plate 264. Geographical distribution of the species *Mitra (Mitra) cardinalis* (Gmelin) and *M. (M.) bovei* Kiener.

- 1798 *Mitra monachialis* Röding, Museum Boltenianum, p. 136 (refers to Chemnitz, vol. 4, pl. 147, figs. 1358, 1359); 1967 Cernohorsky, Journal of Conchology, vol. 26, p. 94.
- 1811 *Mitra archiepiscopalis* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 199; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 957, pl. 1, fig. 4 (figured holotype).
- 1811 *Mitra cardinalis* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 199; 1838 Kiener, Spécies générale iconographie coquilles vivantes, vol. 3, p. 4, pl. 3, figs. 6,6; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 4, fig. 26; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 3, pl. 3, fig. 32; 1959 Kira, Colored Illust. Shells Japan, vol. 1, p. 89, pl. 34, fig. 10; 1965 Cernohorsky, Veliger, vol. 8, p. 82, pl. 13, fig. 2; 1966 Cernohorsky, Veliger, vol. 9, p. 105, fig. 4 (radula).
- 1822 *Mitra pertusa* Swainson, Exotic Conchology, pt. 4, 2 figures (non *Voluta pertusa* Linnaeus, 1758); 1968, Abbott, Exotic Conchology [reproduction, Delaware Mus. Nat. Hist., p. 24, pl. 30].
- 1838 *Mitra lamarkii* Deshayes, Kiener, Spécies générale iconographie coquilles vivantes, vol. 3, p. 5, pl. 3, fig. 7 (non Deshayes, 1832).
- 1905 *Mitra vermiculata* Dall, Proc. U.S. Nat. Museum, vol. 29, p. 431 (refers to Martyn, vol. 3, pl. 105, lower figure); 1907 Dall, Proc. U.S. Nat. Museum, vol. 33, p. 189.

Types—Gmelin most probably did not own a specimen and his description was based on literature indications. His first reference to Lister, 1685-92, pl. 838, figure 65, is here designated as the lectotype of *M. cardinalis* (Gmelin). The holotype of *M. archiepiscopalis* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/45. The types of *M. monachialis* Röding, *M. vermiculata* Dall, and *M. vermiculosa* Dautzenberg, have been dispersed by auction. Kiener's specimen of his *M. lamarkii* (non Deshayes, 1832) is in the Museum d'Histoire Naturelle, Geneva, and is a worn *M. cardinalis*.

Records—INDIAN OCEAN ISLANDS: Madagascar (von Martens, 1880); Mauritius (Viader, 1937); Port Blair, Andaman Islands (Steiner coll.). CEYLON: (AMNH). INDONESIA: E side of Pulau Masa, W. of Pulau Bai; Pulau Stupai, Mentawai I., off Sumatra (both USNM). PHILIPPINE ISLANDS: Lubang I., Cebu I.; Sanga Sanga (both DMNH); Borongan village, Samar (USNM; DMNH). RYUKYU ISLANDS: S Kunigami-Gun, Okinawa I. (USNM); Kadena, Okinawa I. (AMNH). MARIANAS: Guam Island (USNM). PALAU ISLANDS: Gorokotan I. (DMNH); Angan Island (USNM). CAROLINE ISLANDS: Ponape Island (AMNH); Matlock I. (DMNH). MARSHALL ISLANDS: Rujoro I., Eniwetok Atoll; NE side of Namu, Bikini Atoll (both USNM); Kwajalein Island (AMNH; DMNH). NEW GUINEA: Port Moresby; Samarai (both Kleckham coll.). AUSTRALIA: N of Cooktown, Queensland (AMNH; DMNH). SOLOMON ISLANDS: Gizo Island (Steiner coll.); Auki, Malaita I.; Marau Sound, Guadalcanal I.; Buka, Bougainville I. (AIM). NEW HEBRIDES: Port Havenah, Efate I. (Debant coll.); Vila, Efate I. (Cernohorsky coll.); Bushmens Bay, Malekula I. (AIM). NEW CALEDONIA: Touho Reef (DMNH). LOYALTY ISLANDS: Lifu Island (IRS). GILBERT ISLANDS: Betio-Bairaki causeway, Tarawa I. (Holmes coll.); Bikenibeu, Tarawa I. (Cernohorsky coll.). WALLIS & FUTUNA ISLANDS: N coast of Faioa, Wallis I.; W side of Anse de Sigave, Hoorn I., Futuna I. (both USNM). FIJI ISLANDS: Rat Tail Passage, Suva Harbour, S. Viti Levu; Cuvu beach, SW Viti Levu, Manava I., N Viti Levu; Viti Levu Bay, NE Viti Levu; Leleuvia I. near Ovalau I. (all Cernohorsky coll.). SOCIETY ISLANDS: Mitirapa, Taruvaro, Tahiti; W end of Fare Ute, Papeete, Tahiti (both USNM). TUAMOTU ISLANDS: (USNM); Tikehau Island (USNM).

Mitra nubila *subspecies nubila* (Gmelin, 1791)

(Color pl. 253; pls. 265, 266)

Range—Red Sea to Tonga and the Phoenix Islands.

Remarks—This rather rare species has a wide but scattered distribution which may be due to the lack of collecting in intervening areas. The species is moderately large, occasionally inflated at the sutures in gerontic specimens, sculptured with punctate spiral striae and ornamented with brown axial streaks or bands and small scattered snow-white spots.

Several names have been proposed for the various colour and sculptural forms of this species. The typical colour form with continuous or interrupted brown bands or sparse ornamentation of irregular or round blotches, and a shell with inflated whorls, is represented by the names *M. versicolor* Lamarck, *M. nivosa* Swainson, *M. nebulosa* Reeve (non Broderip), *M. propinqua* A. Adams and in part *M. erronea* Dohrn. Kiener's figure of *M. versicolor* represents the more slender form, which is heavily maculated with brown zones and has a coarser sculpture, and is similar to the form illustrated here from the Solomon Islands. The form *M. brettinghami* has an ornamentation consisting of two faint transverse bands and longitudinal stripes instead of blotches; this form is more frequently collected in the Fiji Islands than in other areas. The shallow or deeper punctate grooves and intervening flat or risen spiral cords are another variable feature in this species.

The species was reported by Hugh Cuming from Anaa Island, in the Tuamotus. This record remains unconfirmed, pending collection of the species from this area.

Habitat—The species shows a preference for clean and usually coarse coral sand, and occurs from the intertidal zone to a depth of 10 fathoms.

Description—Shell to 70 mm (about 3 inches) in length, elongate-ovate or fusiformly-ovate, occasionally somewhat inflated in large specimens, particularly near the sutures. Whorls 8-10 with



Plate 265. *Mitra nubila nubila* (Gmelin). Half-row of radula from Porto Amelia, Mozambique, East Africa.

1½-2 cylindrical nuclear whorls. Post-nuclear whorls with 5 or 6 punctate spiral grooves, penultimate whorl with 6-10 punctate spirals, last whorl with 17-33 spirals; the spiral grooves are either shallow or moderately deep and the intervening cords are completely flat or slightly elevated. Axial striae cross spiral grooves and often become quite prominent towards the sutures in some individuals. Aperture equal in height to or longer than the spire, moderately wide, smooth and porcellaneous-white within; columella calloused anteriorly and with 4 or 5 strong, oblique folds. Outer lip slightly convex and minutely crenulate, siphonal canal straight or slightly recurved, calloused and sculptured with oblique spiral cords, siphonal notch distinct. White in colour, or-namented with brown axial stripes and 2 or 3 indistinct transverse zones, or prominently banded or chevron-spotted with brown. Some specimens

have irregular brown zones or round blotches particularly at the sutures, and many individuals have small white spots irregularly scattered over the surface or may border the axial lines; the columella and aperture are white.

Measurements (mm)—

length	width	height of aperture	
67.8	23.7	34.6	Lectotype of <i>brettinghami</i>
61.0	20.4	33.2	Lectotype of <i>propinqua</i>
58.0	23.0	32.0	Suva harbour, Fiji Ids.
54.0	19.1	29.7	Mozambique
51.0	17.9	27.9	Guadalcanal, Solomon Ids.
42.0	16.0	23.0	Nuku'alofa, Tonga Ids.

Synonymy—

1784 *Mitra versicolor* Martyn, Universal Conchologist, vol. 1, pl. 23 (Friendly Islands = Tonga I. [non binomial]).

1791 *Voluta nubila* Gmelin, Systema Naturae, ed. 13, p. 3450 (refers to Martyn, vol. 1, pl. 23; here designated as the lec-

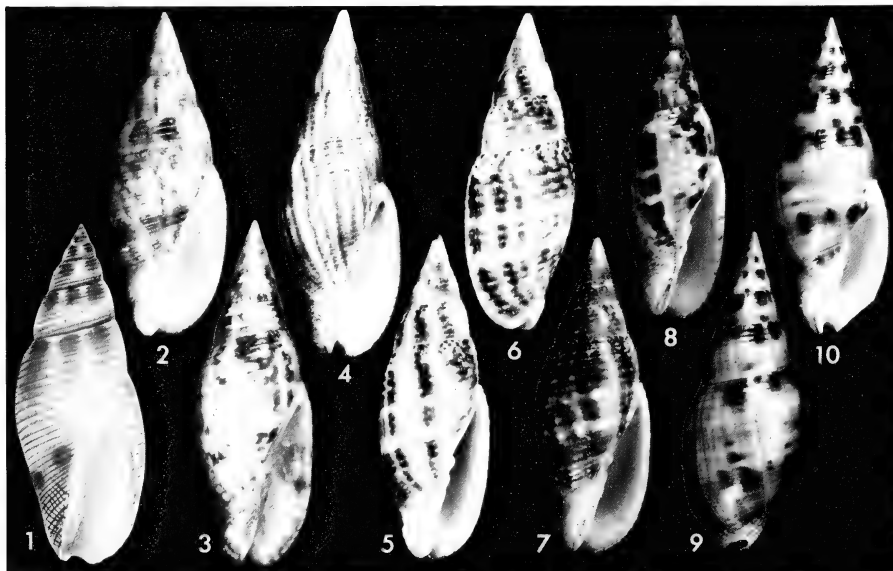


Plate 266. Figs. 1-8, *Mitra nubila nubila* (Gmelin). Figs. 9, 10, *M. nubila lamarkii* Deshayes.

Fig. 1. Lectotype figure from T. Martyn, 1784, pl. 23, from the Tonga Ids.

Fig. 2. Topotype from Nuku'alofa, Tonga Ids. (WOC coll.; 42.2 x 16.1 mm).

Fig. 3. Lectotype of *Mitra propinqua* A. Adams (BM (NH) 1967846; 61.0 x 20.4 mm).

Fig. 4. Lectotype of *Mitra brettinhami* E. A. Smith (BMNH) 1967937; 67.8 x 23.7 mm).

Figs. 5, 6. Specimen from Marau Sound, Guadalcanal, Sol-

omon Ids.; slender, coarsely sculpture form (Gower coll.; 51.0 x 17.9 mm).

Fig. 7. Specimen from Marau Sound, Guadalcanal, Solomon Ids.; broad, coarsely sculptured form (Gower coll.; 48.2 x 17.6 mm).

Fig. 8. Specimen from Mozambique, East Africa; slender, smooth form (WABP coll.; 54.0 x 18.5 mm).

Figs. 9, 10. Specimen of *Mitra nubila lamarkii* Deshayes, from near Rabbit Id., Oahu, Hawaiian Ids.; damaged outer lip (Schoenberg coll.; 49.7 x 18.9 mm).

- totype); 1967 Cernohorsky, Journal of Conchology, vol. 26, p. 163.
- 1811 *Mitra versicolor* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 199 (refers to Martyn, vol. 1, pl. 23); 1838 Kiener, Spécies générale iconographie coquilles vivantes, vol. 3, p. 6, pl. 7, fig. 18; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 1, fig. 2; 1861 Dohrn, Malakozoologische Blätter, vol. 8, p. 134; 1874 Sowerby, Theaurus Conchyliorum, vol. 4, p. 3, pl. 4, figs. 44, 45; 1906 E. A. Smith, Proc. Malac. Soc. London, vol. 7, p. 124; 1935 Ostergaard, Bull. Bernice P. Bishop Mus. no. 131, p. 37; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 957.
- 1822 *Mitra nivosa* Swainson, Cat. Coll. Bligh, App. p. 16 (refers to Martyn, vol. 1, fig. 23) [coasts of New Holland and Pacific Ocean Islands].
- 1839 *Mitra sanguinolenta* Lamarck, Küster, Syst. Conchylien-Cabinet, ed. 2, vol. 5, p. 88, pl. 27, figs. 6, 7 (non Lamarck, 1811).
- 1844 *Mitra nebulosa* Reeve, Conchologia Iconica, vol. 2, pl. 1, fig. 3 (Madagascar; Anaa I.) 1874 Sowerby, Theaurus Conchyliorum, vol. 4, p. 3, pl. 3, fig. 39 (non Broderip, 1836).
- 1853 *Mitra propinqua* A. Adams, Proc. Zool. Soc. London, for 1851, p. 270; 1874 Sowerby, Theaurus Conchyliorum, vol. 4, p. 3, pl. 5, fig. 59.
- 1861 *Mitra erronea* Dohrn, Malakozoologische Blätter, vol. 8, p. 134 (substitute name for *M. versicolor* Kiener, 1838, and *M. nebulosa* Reeve, 1844) [Indian Ocean; New Holland; Madagascar; Anaa I.].
- 1906 *Mitra bretteghami* E. A. Smith, Proc. Malac. Soc. London, vol. 7, p. 124 (Substitute name for *M. propinqua* Sowerby, 1874) [no locality given].
- 1965 *Mitra nubila* (Gmelin), Cernohorsky, Veliger, vol. 8, p. 92, pl. 13, fig. 8 (adult), fig. 8a (juvenile).

Types—The type of *M. nubila* (Gmelin) is no longer traceable and the two figures on plate 23 from Martyn, 1784, are designated as the lectotype. Lamarck's original 2 type specimens of *M. versicolor* have been incorporated with the 5 extant specimens in the de Lessert collection in the Museum d'Histoire Naturelle, Geneva, and cannot be segregated. The type of *M. nivosa* Swainson, has been sold at auction, while the 2 syntypes of *M. erronea* Dohrn, are untraceable. The designated lectotype and 2 syntypes of *M. propinqua* A. Adams, BM(NH) no. 1967846, and the designated lectotype and 2 syntypes of *M. bretteghami* E. A. Smith, BM(NH) no. 1967937, are both in the British Museum (NH).

Records—RED SEA: Museri I., Dahlak Archipelago (TAU). EAST AFRICA: Porto Amelia, Mozambique (AMNH; Orr coll.); Fort Mocambique, Mozambique (USNM; DMNH); Inhaca Island, Lorenzo Marques, Mozambique; Moshinga Island, Mozimba da Praia, N. Mozambique (both Orr coll.). ZANZIBAR: (USNM; AMNH; DMNH; MCZ). INDIAN OCEAN ISLANDS: Madagascar (AMNH); Mauritius (von Martens, 1880). CEYLON: (AMNH). SOLOMON ISLANDS: Marau Sound, Guadalcanal (USNM; DMNH; Devynzer coll.; Cernohorsky coll.); Ataa I., Malaita I. (Clover coll.). FIJI ISLANDS: Bay of Islands, Suva Harbour, S. Viti Levu, 8 faths. (Cernohorsky coll.); Wadigi I., Mamanuca group (Jennings coll.); Yewalu reef, 7 mi. W. of Lautoka, W. Viti Levu (Jameson coll.; Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu I. (Cernohorsky coll.). SAMOA ISLANDS: (Powell coll.). PHOENIX ISLANDS: Hull Island (USNM).

***Mitra nubila subspecies
lamarckii* Deshayes, 1832**
(Color pl. 253; pl. 266, figs. 9, 10)

Range—Hawaiian Islands.

Remarks—The subspecies is similar in form and size to the Indo-Pacific *M. nubila nubila* and differs primarily in colour ornamentation and generally weaker spiral sculpture. The ornamentation is less clouded in the subspecies *lamarckii* and usually consists of a single spiral row of moderately large, rectangular, dark brown spots at the suture of the body whorl, followed by a plain area and then by about 4 spiral rows of smaller spots towards the lower centre and a few solitary spots near the anterior. The spiral bands, axial stripes and small white flakes, usually encountered in the various colour forms of *M. nubila nubila*, are absent in the subspecies *lamarckii*. The shell surface is more shining and the spiral striae are finer and less deep than in the nominate subspecies.

M. nubila lamarckii is endemic to the Hawaiian Islands but is rarely collected alive. It is generally procured by SCUBA-divers at depth ranging from 6-10 fathoms, on a sand and coral-rubble substratum.

Measurements (mm)—

length	width	height of aperture	
70.0	—	—	Type figure of <i>lamarckii</i>
52.3	17.0	26.6	Kawaihae Harbor, Oahu I.
47.5	17.5	23.8	Niihau Island
40.0	14.0	19.0	Kewalo, Honolulu
23.0	8.2	13.0	Honolulu Harbor

Synonymy—

- 1832 *Mitra lamarckii* Deshayes, Encycl. Meth. Hist. Nat. vers., vol. 2, pt. 2, p. 448 (no locality given); 1844 Deshayes & Edwards, Hist. nat. anim. sans vertèbres, ed. 2, vol. 10, p. 342; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 4, sp. 22; 1874 Sowerby, Theaurus Conchyliorum, vol. 4, p. 3, pl. 5, fig. 58; 1923 Mant, Nautilus, vol. 36, p. 122; 1952 Tinker, Pacific Sea Shells, p. 64, plate facing page, lower row, centre figure.
- 1964 *Mitra nebulosa* Swainson, Weaver, Hawaiian Shell News, vol. 12, no. 8, p. 1, figs. 1, 2; 1969 Anonymous, Hawaiian Shell News, vol. 17, no. 12, p. 6, 2 figs (non *M. nebulosa* Broderip, 1836).

Types—The type of *M. nubila lamarckii* Deshayes, is not in the Ecole des Mines, Paris, and its whereabouts are unknown. No locality was given by Deshayes or by subsequent 19th century authors. The species was first reported by C. Mant (1923), from dredgings at Kewalo Harbour, Honolulu, Oahu, and this correct locality indication is designated as the type locality for *M. nubila lamarckii*.

Nomenclature—The subspecies *lamarckii* has

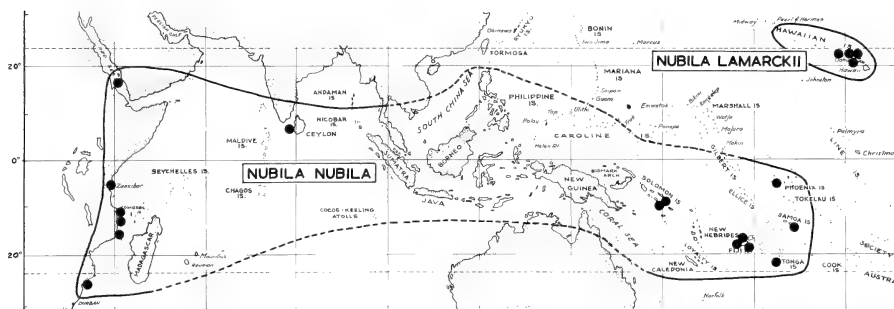


Plate 267. Geographical distribution of *Mitra nubila nubila* (Gmelin) and its subspecies, *M. nubila lamarckii* Deshayes.

been either compared or confused with the species *M. cardinalis* (Gmelin), by Tryon, Kiener and other authors. The close relationship with *M. nubila* has been first recognized by Ostergaard (1935). The specimen figured as *M. lamarckii* by Kiener (1838), is not this species but a colour form of *M. cardinalis* (Gmelin). The best coloured figures of *M. nubila lamarckii* are those by Sowerby (1874).

Records—HAWAIIAN ISLANDS: Honolulu, Oahu, dredger dump (USNM); Pearl Harbor, Oahu (DMNH); Kewalo Harbor, Honolulu, Oahu (Powell coll.); Paumotu, Oahu (Devener coll.); Moanalu Bay, Oahu, 10 faths. (Clover coll.); Makua, Oahu (DMNH); Kawaihae Harbor, Oahu, 10 faths. (Weaver, 1964); Rabbits L., E. coast Oahu, 7 faths. (Schoenberg coll.); Niihau Island (AIM; Powell coll.).

Mitra rossiae Reeve, 1844

(Pl. 268)

Range—Mauritius and Cargados-Carajos Islands.

Remarks—This rare *Mitra* species appears to have a restricted distribution in the Indian Ocean. Apart from Reeve's 3 syntypes, we have seen only one other specimen, and all specimens examined were in comparatively poor condition. Nothing is known about the species habitat or anatomy.

Description—Shell up to 54 mm (about 2 inches) in length, elongate-ovate, rather solid. Whorls 7-8 apart from protoconch, spire whorls slightly convex, sutures distinct. Sculptured with punctate spiral striae which number from 5-6 on the penultimate and from 15-18 on the body whorl. Some adult specimens are axially striate



Plate 268. *Mitra (Mitra) rossiae* Reeve.

Figs. 1, 2. Lectotype of *M. rossiae* Reeve; immature specimen (BM (NH) 1967862; 53.4 x 19.8 mm) [photo courtesy of J. Taylor, BM (NH)].

Fig. 3. Syntype of *M. rossiae* Reeve BM (NH) 1967862; 48.4 x 19.2 mm).

Figs. 4, 5. Specimen from Mauritius (AMNH 47356; 49.2 x 19.0 mm).

and spiral punctures become longitudinally oriented lirae which are usually most prominent near the sutures. Aperture longer than the spire, moderately narrow, smooth within; outer lip thickened and smooth, ornamented with 15-16 small, brown spots or short streaks. Columella calloused and with 4 or 5 oblique folds and a prominent dark brown stain on the anterior of the siphonal fasciole; siphonal canal straight, somewhat calloused, siphonal notch distinct. White or cream in colour, ornamented with reddish brown spiral lines and short, irregularly spaced axial lines in between spirals; a row of small brown spots is visible near the sutures, and in some specimens there is an additional row of widely spaced, quadrate and slightly larger spots on the centre of the body whorl. Aperture white, lower part of columella and siphonal fasciole dark reddish-brown.

Measurements (mm)—

length	width	height of aperture	
53.4	19.8	32.0	Lectotype of <i>rossiae</i>
49.2	19.0	31.0	Mauritius
48.4	19.2	31.1	Syntype of <i>rossiae</i>
37.3	13.5	21.8	Syntype of <i>rossiae</i> (juvenile)

Synonymy—

1824 *Mitra tessellata* Swainson, Quart. Journal Scienc. Arts, vol. 17, pt. 33, p. 34 (no locality given); 1829 Swainson, Zoological Illustrations, ser. 2, vol. 1, pl. 5, fig. 2 (size c. 44.5 mm) [non Lamarck, 1811].

1838 *Mitra ornata* Schubert & Wagner, Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 41, pl. 3, fig. 8 (no locality given) [non Schubert & Wagner, 1829].

1844 *Mitra rossiae* Reeve, Conchologia Iconica, vol. 2, pl. 25, fig. 198 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 3, pl. 8, fig. 113 (Mauritius); 1880 von Martens, Beitr. Meeresfauna Mauritius & Seychellen, p. 249; 1937 Viader, Mauritius Institute Bull., vol. 1, p. 22.

Types—The designated lectotype and 2 syntypes of *M. rossiae* Reeve, are in the British Museum (NH) no. 1967862. The type of *M. tessellata* Swainson, originally in the Mawe collection, is lost, while the type of *M. ornata* Kiener, has been merged with specimens from the de Lessert collection in the Museum d'Histoire Naturelle, Geneva. The first correct locality indication of Mauritius by Sowerby (1874) is designated as the type locality of *M. rossiae*.

Nomenclature—*Mitra tessellata* Swainson, is not pre-occupied by *M. tessellata* Martyn, a rejected non-binomial name, but by *M. tessellata* Lamarck, 1811, a name published in synonymy of *M. granulosa* Lamarck, and made available through usage by subsequent authors. *M. rossiae*

has been proposed in lieu for Kiener's *M. ornata*, which is not the species described and illustrated by Schubert & Wagner, 1829.

Records—MAURITIUS: (AMNH, Sowerby, 1874; von Martens, 1880; Viader, 1937). CARGADOS-CARAJOS ISLANDS: (von Martens, 1880).

Mitra ambigua Swainson, 1829

(Color pl. 255, figs. 1, 2; pl. 269, fig. 1)

Range—East Africa to Polynesia; also Pliocene of Indonesia.

Habitat—On coral reefs, under rocks and coral, generally on a hard reef substratum, within the intertidal zone.

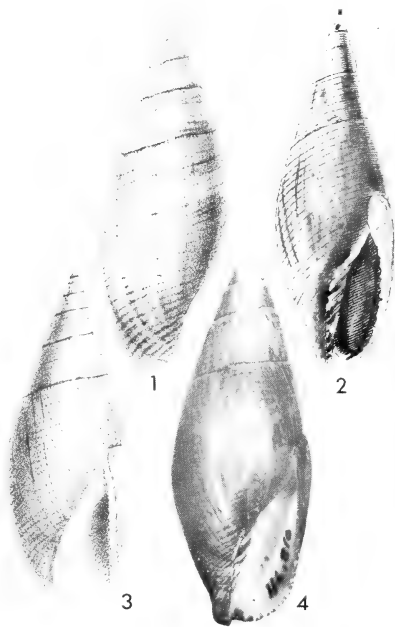


Plate 269. *Mitra (Mitra) ambigua* Swainson (Fig. 1) *M. (M.) coffea* Schubert and Wagner (Figs. 2-4).

Fig. 1. Type figure of *M. ambigua* Swainson (from Swainson, 1829, pl. 30, fig. 2).

Fig. 2. Lectotype figure of *M. coffea* Schubert and Wagner (from Schubert and Wagner, 1829, pl. 225, fig. 3097).

Fig. 3. Type figure of *M. fulva* Swainson (from Swainson, 1829, pl. 30, fig. 1).

Fig. 4. Holotype of *M. thanumiana* Pilsbry from Hilo, Hawaiian Ids. (ANSP 46810; 51.7 x 19.0 mm).

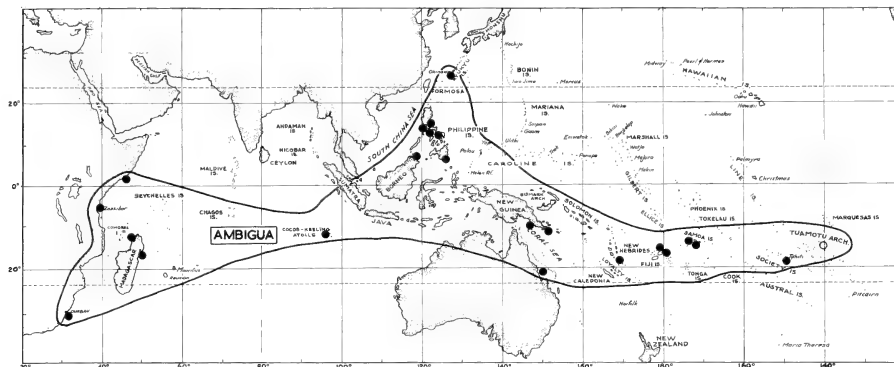


Plate 270. Geographical distribution of *Mitra (Mitra) ambigua* Swainson.

Description—Shell up to 70 mm (about 3 inches) in length, elongate-ovate, solid and heavy. Whorls 7-9, apart from white and usually eroded nuclear whorls; spire whorls flat-sided, sutures distinct. Post-nuclear whorls sculptured with 4 or 5 spiral cords, cords becoming less prominent on the last 2 whorls where they are replaced by 5-8 punctate spiral grooves on the penultimate and 25-35 grooves on the body whorl. Whorls longitudinally striate, striae sometimes fine and obsolete and producing minute crenations at the sutures. Aperture moderately narrow, longer than the spire, smooth within; outer lip fairly straight, slightly constricted centrally, thickened and sculptured with close-set and usually rounded nodules. Columella covered with a thin and glazed callus, and with 5 or 6 close-set and oblique, whitish folds; siphonal canal straight, siphonal fasciole with about a dozen oblique cords, siphonal notch shallow. Dark brown or tan in colour, ornamented with a moderately narrow, white or cream-coloured subsutural band, and small white spots scattered on the lower half of the body whorl; interior of aperture fulvous-brown, siphonal canal occasionally stained purplish grey anteriorly. Periostracum brown and moderately thin.

Measurements (mm)—

length	width	height of aperture	
69.0	25.0	40.7	Manava I., Fiji Ids.
62.0	21.0	34.5	Samoa Ids.
53.0	19.2	30.5	Zanzibar
39.4	15.4	24.6	Luzon, Philippines

Synonymy—

- 1786 *Mitra limosa* Martyn, Universal Conchologist, vol. 3, pl. 105, top figure (*non binomial*).
 1829 *Mitra ambigua* Swainson, Zoological Illustrations, ser. 2, vol. 1, pl. 30, fig. 2 (as *ambigua* in text) [no locality given]; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 2, figs. 8a, b (Ticao I., Philippine I.); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 1, fig. 5, & pl. 11, fig. 70; 1880 von Martens, Beitr. Meeresfauna Mauritius & Seychellen, p. 250; 1936 Hirase, Coll. Japanese Shells, p. 70, pl. 101, fig. 4; 1954 Kira, Colored Illust. Shells Japan, vol. 1, p. 68, pl. 34, fig. 11; 1962 J. Cate Veliger, vol. 4, p. 142; 1965 Cernohorsky, Veliger, vol. 8, p. 81, pl. 13, figs. 4, 4a.
 1905 *Mitra limosa* Dall, Proc. U.S. Nat. Museum, vol. 29, p. 431 (refers to Martyn, 1786, vol. 3, pl. 105, upper figures); 1907 Dall, Proc. U.S. Nat. Museum, vol. 33, p. 189.
 1935 *Mitra (Nebularia) limosa* var. *ambigua* Swainson, Dautzenberg, Mem. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 73; 1950 Beets, Leidsche geol. Meded., vol. 15, p. 310.

Types—The type of *M. ambigua* Swainson, has been merged with the general collection in the Manchester Museum, England, and cannot be segregated. The species was described from unknown locality, and Reeve's first correct locality indication of Ticao Island, Philippine Islands, is designated as the type locality.

Records—EAST AFRICA: Mogadiscio, Somalia (USNM); ZANZIBAR: (AMNH); Chukwani (Cernohorsky coll.). SOUTH AFRICA: Durban, Natal (Steiner coll.). INDIAN OCEAN ISLANDS: Ambatoloaka, Madagascar (AMNH); Nossi-Bé, Madagascar (DMNH; Clover coll.); seaward reef at South I., Cocos-Keeling Ids. (Orr-Maes, 1967). INDONESIA: Sim Sim, Sandakan, N. Borneo (USNM). PHILIPPINE ISLANDS: Boac, Marinduque (Deynzer coll.); Davao Bay, Mindanao; Manila Bay, Luzon (both USNM); Zambales, Luzon (Cernohorsky coll.); Ticao Island (AMNH). RYUKYU ISLANDS: Shuri, Okinawa I. (USNM). NEW GUINEA: Port Moresby (Hinton coll.); Milne Bay (USNM). AUSTRALIA: Pearl reef, Gt. Barrier reef, Queensland (Ashton coll.). NEW HEBRIDES: Port Havannah, N. Efate I. (Debant coll.). FIJI ISLANDS: Manava I., N. Viti Levu (Cernohorsky coll.); Leleuvia I. near Ovalau I. (Miller coll.). SAMOA ISLANDS: (Powell coll.); Asau, Savaii I. (Steiner coll.). SOCIETY ISLANDS: Flint Island, off Tahiti (USNM).

Fossil records—PLIOCENE: Sekoerau, Borneo, Indonesia (Beets, 1950).

Swainson, has been merged with the general collection in the Manchester Museum, England, and the type of *M. attenuata* Reeve (= *M. brevis* Dautzenberg) is in the Cuming general collection in the British Museum (NH). The type of *M. barclayi* Robillard, could not be located; the holotype of *M. thaanumiana* Pilsbry, is in the Academy of Natural Sciences, Philadelphia, no. 46810. The species was described from unknown locality, and Swainson's locality indication of Mauritius for *M. fulva* is designated as the type locality of *M. coffea*.

Nomenclature—Schubert & Wagner's 12th volume of the "Neues systematisches Conchylien-Cabinet" and plate 30 in Swainson's "Zoological Illustrations" have both been published in 1829 without an indication of either the day or month of the year. According to the Code of ICZN, both works are deemed to have been published on the 31st December 1829. Dautzenberg (1935) synonymized *M. fulva* Swainson with *M. coffea* Schubert & Wagner, and adopted the latter taxon for the species under discussion.

Following Reeve, and Garrett (1880), I consider *M. attenuata* Reeve a squat form of *M. coffea* and not a synonym of *M. ambigua*.

Records—INDIAN OCEAN ISLANDS: Mauritius (USNM); Reunion Island (Deshayes, 1863); Nossi-Bé Madagascar (DMNH). PAKISTAN: Karachi (DMNH). PHILIPPINE ISLANDS: Calbayug, Samar (Steiner coll.); Boac, Marinduque (Lumawig coll.). RYUKYU ISLANDS: Bolo reef, NW Nakagami-Gun; Osumi, Oshima (both USNM). MARSHALL ISLANDS: Engebi I., Eniwetok Atoll; Bikini Island; Burok, Rongelap I.; N. side of passage of Bok I., Ujae Atoll; S. of Jabor,

Jaluit Atoll (all USNM). AUSTRALIA: 14 mi. SW of Eaglehawk I., Dampier Archipelago, W. Australia, 14 faths. (WAM). SOLOMON ISLANDS: Russell Island (AIM). NEW HEBRIDES: Atehin I., Malekula I. (USNM); Elate and Aneityum I. (DMNH); Erakor lagoon, Elate I. (Dale coll.); Vanna Lava, Banks group (Powell coll.). WALLIS & FUTUNA ISLANDS: E. of Nukuhifala, Wallis I. (USNM). FIJI ISLANDS: 4 mi. off Lautoka, W. Viti Levu (Cernohorsky coll.); Wadigi I., Mamanuca group (Jennings coll.). CAROLINE ISLANDS: Losap I., Matlocks (DMNH). TONGA ISLANDS: Nuku'alofa, Tongatabu I. (Gay coll.). SAMOA ISLANDS: Tutuila I.; Fangaitua, Tutuila I., Ofu I., Manna group; Falealupo, Savaii I. (all USNM). NIUE ISLAND: (Cernohorsky coll.); Alofi (USNM). COOK ISLANDS: Palmerston Atoll (Steiner coll.); Bird I., Palmerston Atoll; Mangaia Island; Mauke Island; between Angari and Ee, Aitutaki I. (all USNM). AUSTRAL ISLANDS: Rimatara, Tubuai I. (USNM). SOCIETY ISLANDS: NW side of Motu Irii, Raiatea I.; Taone reef, Tahiti (both USNM); Boroboro (DMNH). TUAMOTU ISLANDS: Tikahau, Matiti I. (USNM). MIDWAY ISLAND: (USNM). HAWAIIAN ISLANDS: Keaukaha, Hilo (USNM); off Waikiki, Oahu (BPBM); Alamoana Reef, Oahu I. (DMNH); Kahala, Oahu I., 3 faths. (DMNH).

Fossil records—LATE PLEISTOCENE: Wailupe Point and Mokapu Peninsula, Oahu, Hawaiian Islands (Kosuge, 1969—as *M. ambigua* Swainson).

Mitra fasciolaris Deshayes

in Laborde & Linant, 1834

(Color pl. 255, figs. 12, 13, pl. 272)

Range—Red Sea.

Remarks—This species, which has the appearance of a miniature *M. ambigua* Swainson, is endemic to the Red Sea region.

Habitat—Intertidal.

Description—Shell up to 30 mm (about 1½ inches) in length, elongate-ovate, sutures moderately canaliculate and minutely crenulate. Whorls 6-7, apart from protoconch, spire whorls flat-sided or slightly convex. Postnuclear whorls sculptured with 5 or 6 spiral cords, penultimate whorl with 7-8 punctate grooves and last whorl with 5-13 grooves and 7-10 oblique cords towards the base. In some individuals the punctate spiral grooves become obsolete on the centre of the body whorl. Aperture equal in height or slightly longer than the spire, narrow, slightly widening anteriorly, smooth and bluish-white within. Parietal wall brown, anterior of columella calloused and with 4 or 5 small, oblique folds; labial lip moderately thickened, minutely crenulate at the margin, siphonal canal straight, siphonal notch distinct. Brown in colour, ornamented with a narrow or very broad, white or yellow presutural transverse band on all whorls, and small white spots scattered over the last whorl. Periostracum thin and light brown.



Plate 272. *Mitra (Mitra) fasciolaris* Deshayes in Laborde and Linant.

Fig. 1. Lectotype of *M. arabica* Dohrn from the Red Sea (BM (NH) 1966671; 21.3 x 7.7 mm).

Fig. 2. Syntype of *M. arabica* Dohrn (BM (NH) 1966671; 18.8 x 6.8 mm).

Measurements (mm)—

length	width	height of aperture	
27.6	10.1	13.7	Eilat, Gulf of Aqaba
22.6	8.4	12.5	Eilat, Gulf of Aqaba
21.3	7.7	11.2	Lectotype of <i>arabica</i>
18.8	6.8	10.0	Syntype of <i>arabica</i>

Synonymy—

- 1834 *Mitra fasciolaris* Deshayes in Laborde & Linant, Voyage de L. Arabie Pétrée, p. 66, figs. 18, 19 (Red Sea); 1928 Tomlin & Salisbury, Proc. Malac. Soc. London, vol. 18, p. 33.
 1861 *Mitra arabica* Dohrn, Proc. Zool. Soc. London, p. 206, pl. 26, fig. 4 (Red Sea); 1869 Issell, Malac. Mar. Rosso ric. zool. paleont., p. 265; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 21, pl. 21, fig. 433.
 1882 *Mitra maculosa* Reeve, Tryon, Manual of Conchology, vol. 4, p. 155, pl. 45, fig. 328 (non Reeve, 1844).

Types—The whereabouts of the type of *M. fasciolaris* are unknown. The designated lectotype and one syntype of *M. arabica* Dohrn, are in the British Museum (NH) no. 1966671. The type locality of *M. fasciolaris* is Red Sea.

Records—RED SEA: Eilat, Gulf of Aqaba (K. Haime coll.; Clover coll.; Deynzer coll.; Cernohorsky coll.); Massawa (Jickeli, 1874).

***Mitra imperialis* Röding, 1798**

(Color pl. 253, figs. 15, 16)

Range—Red Sea to East Africa and to western Polynesia.

Habitat—On coral reefs, under rocks and coral and on a coral-rubble substratum, from the intertidal zone to a depth of 50 fathoms.

Description—Shell up to 60 mm (about 2½ inches) in length, elongate-ovate, thick and solid, body whorl plump, sutures distinct and ornamented with small white nodules. Whorls 5-6 apart from a worn and white protoconch, postnuclear whorls sculptured with 5 or 6 spiral cords, penultimate whorl with 5-9 deeply punctate spiral grooves, body whorl with 15-20 grooves and 6 or 7 oblique cords at the base. The spiral grooves are bisected by longitudinal threads which become obsolete on the lower half of the body whorl; the deep pits are situated in between the bisecting axials and spirals. Aperture longer than the spire, widening anteriorly, smooth and orange-brown within; labial lip thickened and sculptured with small and sharp denticles at the margin. Columella fawn or flesh-coloured and with 5 or 6 oblique and regular folds, siphonal canal short and straight or slightly recurved, siphonal notch

distinct. Variable in colour, generally tan or dark brown, irregularly maculated with large and minute white blotches and spots; a broad brown band is situated at the lower third of the body whorl. Periostracum moderately translucent and brown in colour.

Measurements (mm)—

length	width	height of aperture	
50.6	20.4	29.0	Lectotype of <i>millepora</i>
49.0	18.5	27.8	Manava I., Fiji Ids.
40.0	16.8	24.8	Guadalcanal, Solomon Ids.

Synonymy—

- 1789 *Mitra imperialis* Röding, Museum Boltenianum, p. 135 (refers to Chemnitz, vol. 10, pl. 151, figs. 1432, 1433) [no locality given]; 1965 Cernohorsky, Veliger, vol. 8, p. 90, pl. 14, fig. 11; 1967 Orr-Maes, Proc. Acad. Nat. Sci. Philadelphia, vol. 19, p. 138, pl. 13, fig. 1; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 11, fig. 23 (radula).
 1807 *Voluta digitalis* Link, Besch. Nat.-Samml. Univ. Rostock, p. 127 (refers to Chemnitz, vol. 10, pl. 151, figs. 1432, 1433); 1817 Dillwyn, Descr. Cat. Recent Shells, vol. 1, p. 559.
 1811 *Mitra millepora* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 198 (Indian Ocean); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 11, pl. 7, fig. 19; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 956, pl. 1, fig. 3 (figured lectotype).
 1817 *Voluta cribrum* Dillwyn, Descr. cat. Recent Shells, vol. 1, p. 559 (in synonymy of *Voluta digitalis* Dillwyn).
 1844 *Mitra digitalis* Chemnitz, Reeve, Conchologia Iconica, vol. 2, pl. 3, fig. 21; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 20, pl. 13, fig. 207.
 1939 *Mitra (Nebularia) koolhoveni* Oostingh, Ingen. Nederl.-Indie, vol. 6, p. 46, pl. 11, figs. 198a, b (Bantam, Java; Pliocene).
 1957 *Scabricola (Chrysame) pertusa* (Linné), Demond, Pacific Science, vol. 11, p. 324, fig. 36 (non *Voluta pertusa* Linnaeus, 1758).
 1957 *Chrysame pertusa* Linné, Kaicher, Indo-Pacific Sea Shells, sect. 6, pl. 1, fig. 26 (non *Voluta pertusa* Linnaeus, 1758).

Types—The type of *M. imperialis* Röding, may be among Chemnitz's unsorted type material at the Zoological Museum, Copenhagen. The types of *M. millepora* Lamarck, are in the Museum d'Histoire Naturelle, Geneva, no. 1102/44/2-3. No locality was given by Röding, but the figured specimen referred to by Röding came from the East Indies according to Chemnitz, and Sumatra, Indonesia is designated as the type locality.

Nomenclature—Chemnitz (1788) considered *Voluta digitalis* to be the same species as the Linnaean *V. pertusa*, but subsequent authors adopted *Mitra digitalis* for the species, in view of the uncertain identity of the Linnaean taxon. *Voluta pertusa* Linnaeus, has been conveniently disposed of in a recent suppression by the International Commission on Zoological Nomenclature.

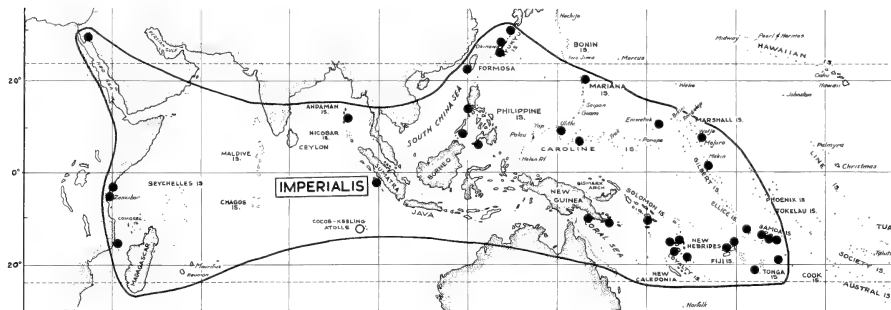


Plate 273. Geographical distribution of *Mitra (Mitra) imperialis* Röding.

Records—RED SEA: Gulf of Aqaba (Hadar coll.). EAST AFRICA: Twiga Beach hotel, 16 mi. S. of Mombasa, Kenya (Steiner coll.); Mocambique, Mozambique (USNM). ZANZIBAR: Jembiani, S. of Paje (Powell coll.). INDIAN OCEAN ISLANDS: Port Blair, Andaman I. (Steiner coll.); Pass S. of Direction I., Cocos-Keeling I. (Orr-Maes, 1967). INDONESIA: Pulau Stupai, Mentawai I., SW Sumatra (USNM). PHILIPPINE ISLANDS: Tilig, Lubang I.; Lampingan, off Basilan; Brookes Point, Palawan I. (all USNM); Calapan, Mindoro (AMNH). FORMOSA: SW Taiwan, 100 m (Steiner coll.). RYUKYU ISLANDS: Osima, Osumi; Shuri, Kiusiu I., Okinawa; Nakadomari, Okinawa (all USNM). MARIANAS: Mang Island (USNM). CAROLINE ISLANDS: Ulithi Atoll (USNM). MARSHALL ISLANDS: Arno Atoll; Engebi I., Eniwetok Atoll (both USNM). NEW GUINEA: Ararat Island (Hinton coll.); Port Moresby (Kleckham coll.). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.; Cernohorsky coll.). NEW HEBRIDES: Atchin Island; Espiritu Santo Island (both USNM); Pango Point, Efate I.; Bushmen's Bay, Malekula I. (both AIM); Teuma Bay, Efate I. (Debant coll.). CAROLINE ISLANDS: Mortlocks (DMNH) GILBERT ISLANDS: Bikini, Tarawa I. (Cernohorsky coll.). WALLIS & FUTUNA ISLANDS: E. end of Nukuhifala, Wallis I. (USNM). FIJI ISLANDS: Manava I., N. Viti Levu; Mana I., Mamanuca group (both Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatabu I. (Gay coll.). SAMOA ISLANDS: Tutuila Island (USNM); Fagali'i, Upolu I. (Powell coll.); Mulinu, W. of Apia (Cernohorsky coll.). NIUE ISLAND: (McDowall coll.).

Fossil record—PLIOCENE: Tjiidjow, Bantam, Java, Indonesia (Oostingh, 1939).

Mitra incompta (Lightfoot, 1786)

(Color pl. 253, fig. 11; pl. 274)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—This species is superficially similar to *M. eremitarum* Röding, but the spire is longer and the aperture appreciably shorter, and the sculpture coarser.

Habitat—The species is moderately rare throughout its distributional range; it lives on a hard reef and coral-rubble substratum, from the intertidal zone to a depth of 20 fathoms.

Description—Shell up to 112 mm (about 4½ inches) in length, fusiformly-elongate, solid and heavy, sutures distinct and minutely crenulate. Nuclear whorls eroded, postnuclear whorls 7-8, spire whorls flat-sided or slightly convex, sculptured with very irregular, slender and crowded axial ribs which are rendered nodulose through bisecting, pitted spiral grooves which number from 6-9 on the penultimate whorl; on the body whorl the spiral grooves become spiral cords towards the base. In some specimens the axial sculpture is subdued. Aperture moderately narrow, shorter than the spire, smooth within; outer

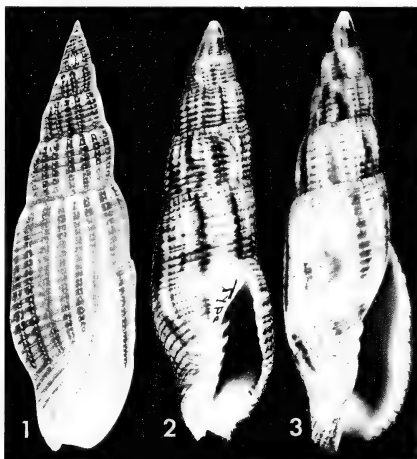


Plate 274. *Mitra (Mitra) incompta* (Lightfoot).

Fig. 1. Lectotype figure of *M. incompta* (Lightfoot) from the South Seas (from Martyn, 1784, pl. 19).

Fig. 2. Holotype of *M. terebralis* Lamarck; immature specimen (MHNG 1102/48/2; 80.9 x 24.0 mm).

Fig. 3. Specimen from Zanzibar, East Africa (AWBP coll.; 86.5 x 23.5 mm).

lip straight, angulate basally, thickened in adult specimens and finely crenulate at the margin. Columella only superficially glazed and with 5 oblique folds; siphonal canal straight or slightly recurved, siphonal notch distinct, siphonal fasciole thickened and corded. Cream in colour, ornamented with dark brown axial stripes which are interrupted by a broad zone on the body whorl; aperture cream to golden-yellow, crenulations on margin of outer lip brown, columella cream. The colour pattern is obscured by a brown and moderately opaque periostracum.

Measurements (mm)—

length	width	height of aperture	
112.0	—	—	Zanzibar
96.0	26.7	44.4	Siasi, Philippines
82.0	22.0	34.6	Oahu, Hawaiian Ids.
80.9	24.0	34.9	Holotype of <i>terebalis</i>
55.0	16.4	24.7	Oahu, Hawaiian Ids.

Synonymy—

- 1784 *Mitra tessellata* Martyn, Universal Conchologist, vol. 1, pl. 19 (non binomial).
 1786 *Voluta incompta* Lightfoot, Catalogue Portland Museum, p. 96, no. 2116 (refers to Martyn, vol. 1, fig. 19) [South Seas]; 1916 Iredale, Proc. Malac. Soc. London, vol. 12, p. 91.
 1791 *Voluta vulpecula* var. b Gmelin, Systema Naturae, ed. 13, p. 3451 (refers to Martyn, vol. 1, pl. 19) [non Linnaeus, 1758].
 1811 *Mitra terebralis* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 201 (no locality given); 1838 Kiener, Species générale iconographie coquilles vivantes, vol. 3, p. 23, pl. 8, fig. 21; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 2, fig. 11; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 7, fig. 94; 1967 Rehder, Proc. U.S. Nat. Museum, vol. 121, p. 17; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 958, pl. 1, fig. 6 (figured holotype).
 1844 *Mitra tessellata* Martyn, Reeve, Conchologia Iconica, vol. 2, pl. 2, fig. 10; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 7, fig. 97; 1967 J. Cate, Veliger, vol. 10, p. 193, pl. 19, fig. 4 (shell), textfig. 4 (radula).
 1850 *Mitra reevei* Philippi, Zeit. f. Malakozoologie, vol. 7, p. 23 (substitute name for *M. terebralis* Reeve, 1844) [Zanzibar].

1961 *Mitra incompta* Lightfoot, J. Cate, Hawaiian Shell News, vol. 9, no. 9, p. 3; 1961 Editor, Hawaiian Shell News, vol. 9, no. 12, textfig.; 1961 J. Cate, Veliger, vol. 4, p. 51; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 11, fig. 22 (radula).

Types—The type of *M. incompta* Lightfoot, was in the collection of the Duchess of Portland and has been sold at auction. We therefore designate the two figures on plate 19 in vol. 1 of Martyn's "Universal Conchologist" as the lectotype of *Mitra incompta* (Lightfoot). The holotype of *M. terebralis* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/48/2; the type of *M. reevei* Philippi, has probably been sold at auction of the Norris collection. The original locality indication is "South Seas" and we further restrict the type locality to Tutuila Island, Samoa Islands (specimen in USNM).

Nomenclature—The usage of the taxon *Mitra tessellata* Martyn, persisted until 1958, when Martyn's work "The Universal Conchologist" was placed on the Official Index of rejected and invalid works in Zoological Nomenclature. After that date the species has to be *M. incompta*, its senior synonym, and not *M. terebralis* which is a junior synonym.

Records—EAST AFRICA: Ras Kankadya and Sinda (Spry, 1961, Tanganyika Notes & Record, no. 56, p. 25). ZANZIBAR: (USNM; DMNH; Powell coll.). NOONGAR REEF (AMNH). PHILIPPINE ISLANDS: Luzon (AMNH); Siasi, Sulu (Powell coll.). MARIANAS: Agaña Bay, Guam I. (BPBM). CAROLINE ISLANDS: Losap Atoll (BPBM). MARSHALL ISLANDS: Uterik Atoll; Ailuk Atoll (both USNM). NEW GUINEA: Losnia, Milne Bay (Kleckham coll.). AUSTRALIA: Hook I., Whitsunday Passage, Queensland (AMNH). NEW HEBRIDES: Teuma Bay, S. Efate I., 10-20 faths. (Debant coll.). ELLICE ISLANDS: Vaitupu (USNM). SAMOA ISLANDS: Tutuila Island (USNM). SOCIETY ISLANDS: Moorea; Moty Iru, Raiatea; Point Teffao, Huahine (all USNM); Tahaa I. (DMNH). HAWAIIAN ISLANDS: off Ala Moana (BPBM); Hilo; Port Allen, Kauai (both USNM); off Makua, Oahu, 7-8 faths. (AMNH); Barber's Point, Oahu, (Cross coll.; Cernohorsky coll.); off Diamond Head, Oahu, 14 faths. (Jewell coll.); TUAMOTU ISLANDS: Anaa (MCZ).

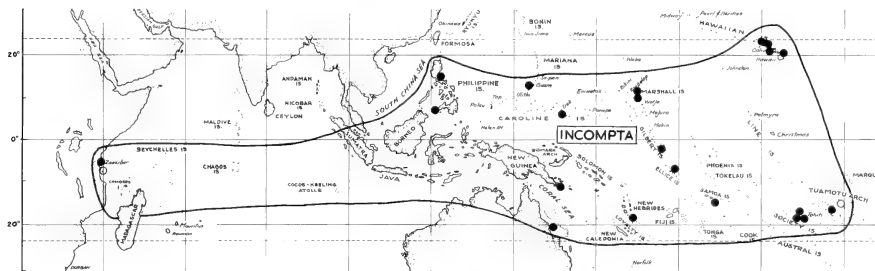


Plate 275. Geographical distribution of *Mitra (Mitra) incompta* (Lightfoot).

***Mitra eremitarum* Röding, 1798**

(Color pl. 255, figs. 7, 8; pl. 276)

Range—Cocos-Keeling Islands, Indian Ocean, to Melanesia and to the Ryukyu Islands.

Remarks—This is a very common species in the southwest Pacific, lacking the axial plications of *incompta*. Garrett (1880) reported the species from Tonga, Samoa, Kingsmill, Caroline I., Cook I., Society I., Tuamotus and the Hawaiian Islands. We have not seen actual specimens east of the Fiji Islands, and Garrett's specimens probably were the similar species, *M. incompta*. *M. eremitarum* has not been recorded from the Hawaiian Islands.

Habitat—On coral reefs, under stones and coral on a sand substratum within the intertidal zone.

Description—Shell up to 80 mm (about 3 inches) in length, elongate-ovate, heavy and solid, sutures prominent and minutely crenulate. Whorls flatisided or slightly convex, numbering from 6-8 inclusive of nuclear whorls which are indistinguishable in adult specimens. Sculptured with shallow spiral grooves which are either smooth or obsoletely punctate, spiral ridges broad and flat or slightly stepped and bisected by dense axial growth-lines which become weakly nodulose at the point of intersection. In large adults, axial striae and spiral ridges become obsolete on the body whorl; spiral ridges number from 6-11 on the penultimate and from 26-38 on the

body whorl. Aperture longer than the spire, wide, smooth within; outer lip thickened and crenulate, posterior crenules occasionally overlaid by callus; columella glazed, calloused and laminated anteriorly in adults, and with 4-6 oblique folds. Siphonal canal straight, siphonal notch prominent. Cream to pale yellow in colour, ornamented with tan or dark rusty-brown longitudinal streaks which are generally interrupted on the body whorl by a pale zone; some specimens have the dark brown periostracum embedded in the spiral grooves. Aperture golden-yellow or light orange, crenulations on outer lip frequently spotted with brown. The colour pattern is partly obscured by a moderately opaque, dark brown periostracum.

Measurements (mm)—

length	width	height of aperture	
78.0	27.7	45.0	Manava I., Fiji Ids.
70.6	23.1	37.2	Lectotype of <i>adusta</i>
51.0	18.8	28.5	Manava I., Fiji Ids.
50.9	19.7	29.0	Lectotype of <i>flavofusca</i>
38.4	14.8	22.2	New Hebrides

Synonymy—

1798 *Mitra eremitarum* Röding, Museum Boltenianum, p. 136 (refers to Chemnitz, vol. 4, pl. 147, fig. 1361); 1965 Cernohorsky, Veliger, vol. 8, p. 87, pl. 13, fig. 3; 1966 Cernohorsky, Veliger, vol. 9, p. 106, figs. 5a, b (radula).

1811 *Mitra adusta* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 201; 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 22, figs. 16, 17; 1915 Tesch, Paläontologie von Timor, Lief. 5, p. 43, pl. 79, figs. 93a, b (Timor, Plio-Pleistocene); 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 959, pl. 1, fig. 7 (figured lectotype).

1811 *Mitra flavofusca* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 201 (coasts of Timor); 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 959, pl. 2, fig. 8 (figured lectotype).

1817 *Voluta ruffina* Dillwyn, Descr. Cat. Recent shells, vol. 1, p. 545 (refers to Lister, Gualtieri, Seba, Knorr, Martini and

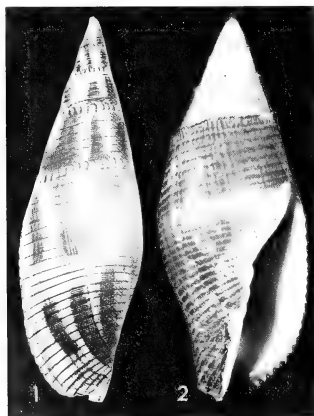


Plate 276. *Mitra (Mitra) eremitarum* Röding.

Fig. 1. Lectotype figure of *M. eremitarum* Röding from the "East Indies" (from Chemnitz, 1780, pl. 147, fig. 1361).

Fig. 2. Specimen from Bushmen's Bay, Malekula Id., New Hebrides; short, broad, brown-banded form (WOC coll.; 38.4 x 14.8 mm).

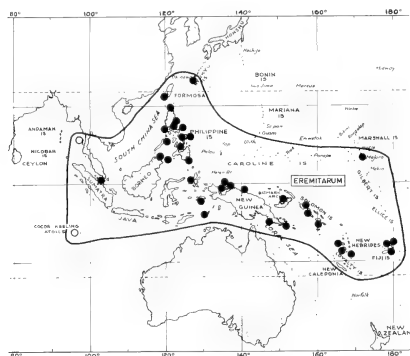


Plate 277. Geographical distribution of *Mitra (Mitra) eremitarum* Röding.

Tabl. Encycl. Méthodique) [Eastern Ocean] (non Linnaeus, 1767).

1840 *Mitra terebralis* Swainson, Treatise Malacology, p. 318 (refers to Tabl. Encycl. Méthodique, pl. 369, fig. 5) [non Lamarck, 1811].

1935 *Mitra (Nebularia) adusta* var. *brevis* Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 66 (Rua-Sura, Solomon I.).

1957 *Chrysam ecremarum* (Röding), Kaicher, Indo-Pacific Sea Shells, sect. 6, pl. 2, fig. 27.

Types—The whereabouts of the types of *M. ecremarum* are unknown, and we designate figure 1361 on plate 147 in vol. 4 of Chemnitz, 1780, as the lectotype of *M. ecremarum* Röding. The lectotype of *M. adusta* Lamarck, no. 1107/92/2 and *M. flavofusca* Lamarck, no. 1107/93/2 are both in the Museum d'Histoire Naturelle, Geneva. No locality was given by Röding, but the cited specimen came from the "East Indies", which is further restricted as the type locality to Pombo Island, Haruku Strait, East of Ambon, Indonesia (Specimen in WAM).

Records—COCOS-KEELING ISLAND: Pass at Pulo Siput (Orr-Maes, 1967). BURMA: Laloon Bay, Elphinstone I., Tenasserim coast (von Martens, 1887). INDONESIA: Selangan I., Sandakar, N. Borneo; Pasir Gedank I., near Padang, Sumatra (both USNM); N. side Teluk Dodinga near Ternate, Halmahera; Pombo I., Haruku Straits, E. of Ambon; Kampong, Namatabung, Labuan Olendir, Selaru, Tanimbar (all WAM). PHILIPPINE ISLANDS: Pangangon I., Bohol (Steiner coll.); Alabat I., near Luzon I., Quezon; Port Tataan, Tawi Tawi group; Port Palabag, Batag I., Samar; E. coast of Polillo; Bataan I., Batanes group; Tilig, Lubang I.; Port Laugan, Dumarau

Point, Palawan (all USNM); Borongon village, Samar I. (AIM); Gigmoto, Catanduanes I. (Powell coll.); Davao City, Mindanao (WAM). FORMOSA: off Kao-Hsiung (Steiner coll.). RYUKYU ISLANDS: (USNM). MARSHALL ISLANDS: Majuro Atoll, N.E. end of lagoon (USNM). NEW GUINEA: Taurama Point, Port Moresby (Hinton coll.); near Gamododo, Milne Bay; Mios Woendi, Schouten I.; Biak I., Schouten I.; near Hollandia (all USNM); Boensaki, W. of Sovek, Soepiori, Schouten I. (AIM). NEW BRITAIN: Talasea reef (AMNH). SOLOMON ISLANDS: Treasury Island (USNM); Choiseul Island (AIM); Marau Sound, Guadalcanal (Cernohorsky coll.); Santa Isabel I.; Malaita I. (DMNH). NEW HEBRIDES: Palikulo Bay, Espiritu Santo (USNM); Bushmens Bay, Malekula I. (Cernohorsky coll.); Tuki Tuki Point, Efate I. (Colardeau coll.); Port Havannah, Efate I. (Debant coll.); Erakor reef, Efate I. (Cernohorsky coll.); FIJI ISLANDS: Manava I., N. Viti Levu (Cernohorsky coll.); Viti Levu Bay, Viti Levu (Cernohorsky coll.); Rat Tail Passage, Suva reef, S. Viti Levu (Cernohorsky coll.).

Fossil records—PLIOCENE: Gendingan, Sonde beds, Java, Indonesia (Martin, 1895). PLIO-PLEISTOCENE: Noil Fatoe near Niki-Niki, Timor, Indonesia (Tesch, 1915).

Mitra guttata Swainson, 1824

(Pl. 278)

Range—Persian Gulf to Mauritius and Ceylon.

Remarks—This species is rare, and all specimens examined were obviously collected as empty shells. Most of these specimens originated from Ceylon, but von Marten's (1880) record of the species from Mauritius, would indicate a wider geographical distribution than present material would indicate. The record of *M. solida* by Ray

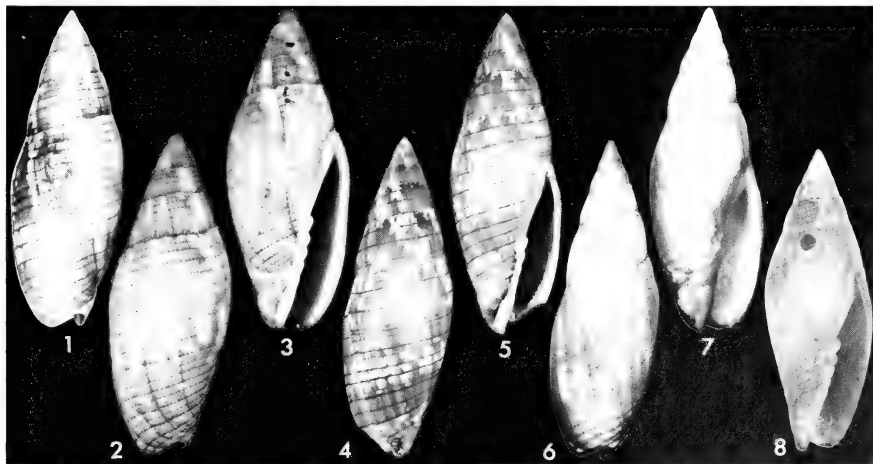


Plate 278. *Mitra (Mitra) guttata* Swainson.

Fig. 1. Specimen from Ceylon (BM (NH); 48.2 x 17.2). Figs. 2, 3. Specimen from Ceylon; beach-worn (AMNH 98370; 36.5 x 14.2 mm).

Figs. 4, 5. Holotype of *M. boswellae* J. Cate, from unknown

locality; beach-worn (SAM A-29799; 70.5 x 24.6 mm).

Fig. 8. Holotype of *M. vaticinator* Melvill from off Muscat, Arabia; juvenile (BM (NH) 1921.1.28.6; 26.0 x 9.4 mm).

Figs. 6, 7. Holotype of *M. floccata* Reeve; slender form (BM (NH) 1967759; 54.0 x 18.6 mm).

(1954) from Bombay, Karachi and the Persian Gulf, may have actually been specimens of *M. guttata*. A. Adams' (1864) record of the species from Mososeki, Japan, remains unconfirmed, while J. Cate's (1964) record of *M. boswellae* from off Durban, Natal, South Africa, has been based on assumptions.

Habitat—Unknown, but probably in deeper water.

Description—Shell up to 70 mm (about 3 inches) in length, elongate-ovate, immature individuals more cylindrically-ovate, rather solid. Whorls 8-9, apart from a worn protoconch, spire whorls regularly convex, sutures distinct and irregularly serrated and with fine axial lirae on the anterior part of the body whorl. Sculptured with finely punctate spiral grooves which may become less distinct on the last two whorls and in some individuals are confined to the anterior part of the sutures; spiral grooves number from 4-7 on the penultimate and from 5-18 on the body whorl, base of shell with 5-10 oblique cords. Aperture longer than the spire, moderately open, smooth within; outer lip moderately thickened in adults, regularly convex and with about half a dozen small and sometimes weak denticles anteriorly. Columella glazed or calloused in adults and with 4-6 oblique folds, siphonal canal straight, siphonal notch distinct. The colour of fresh but not live-collected specimens is either reddish-brown or orange-brown, and the ornamentation consists of small white spots, flakes, axial or spiral streaks which occasionally form a nebulous, broken white band on the lower third of the body whorl; some specimens have thin, dark brown spiral lines which coincide with the spiral grooves; aperture and columella fawn or orange-brown in colour.

Measurements (mm)—

length	width	height of aperture	
70.5	24.6	38.2	Holotype of <i>boswellae</i>
54.0	18.6	28.0	Holotype of <i>floccata</i>
48.2	17.2	28.0	Ceylon
26.0	9.4	15.6	Holotype of <i>vaticinator</i>

Synonymy—

- 1824 *Mitra guttata* Swainson, Quart. Journal Sci. Arts, vol. 17 no. 33, p. 35 (no locality given); 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 10, sp. 69; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 4, pl. 11, fig. 166; 1880 von Martens, *Beitr. Meeresf. Mauritius & Seychellen*, p. 250; 1882 Tryon, *Manual Conchology*, vol. 4, p. 116, pl. 34, fig. 31 (Ceylon).
1844 *Mitra floccata* Reeve, *Conchologia Iconica*, vol. 2, pl. 3, fig. 16 (no locality given); ? 1864 A. Adams, *Journ. Linn. Soc. London*, vol. 7, p. 198; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 4, pl. 12, fig. 186; 1880 von Martens,

- Beitr. Meeresf. Mauritius & Seychellen*, p. 249; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 115, pl. 34, fig. 29.
1918 *Mitra vaticinator* Melvill, *Ann. & Mag. Nat. History*, ser. 9, vol. 1, p. 141, pl. 4, fig. 6 (off Muscat, Arabia) [juvenile specimen].
1964 *Mitra (Mitra) boswellae* J. Cate, *Veliger*, vol. 6, p. 219, pl. 28, figs. 1a, b (off Durban, Natal, South Africa, *ex-pisces* = origin of holotype unknown!).

Types—The whereabouts of Swainson's 2 type specimens of *M. guttata* are unknown. The holotype of *M. floccata* Reeve, B. M. (NH) no. 1967759 and the holotype of *M. vaticinator* Melvill, B. M. (NH) no. 1921.1.28.6, are in the British Museum (NH). The holotype of *M. boswellae* J. Cate, is in the South African Museum, Cape Town, no. A-29799. *M. guttata* was described from unknown locality, and Tryon's (1882) first correct locality indication of Ceylon, is here designated as the type locality.

Nomenclature—The origin and locality of the holotype of *M. boswellae* J. Cate, is unknown, and the describer's indication of "off Durban, Natal, southeast Africa, *ex-pisces*" has been based on mere speculation. In a letter written by Mrs. Boswell, and accompanying the holotype, it is made quite clear that she received the holotype of *M. boswellae* in a box of shells whose origin was unknown, and the locality Durban, and the fact that it came from the stomach of a fish, were simply assumptions. The late Dr. Barnard had misgivings about the inclusion of the species in the South African fauna, and appended a note to the holotype which reads as follows: "Box given to Mrs. Boswell was probably part of the collection made by H. W. Bell-Marley (Fisheries Inspector). Doubtful this *Mitra* was *ex-pisces*—see the barnacles in anterior canal and traces on surface where they have been cleaned off. Locality very doubtful." The holotype of *M. boswellae* is a large but otherwise typical individual of *M. guttata* Swainson, and a specimen with very similar colour markings has been figured by Reeve (1844, pl. 10, fig. 69).

When Melvill described *M. vaticinator*, he compared it to *M. guttata*, *M. floccata* and *M. solida*, not realizing that he was dealing with a juvenile specimen. Young and immature individuals of Mitridae are often appreciably different to adults, with a more pupiform shape and crisper sculpture. Melvill's species is undoubtedly a juvenile of *M. guttata*.

Records—CEYLON: (BMNH; IRSN; AMNH; DMNH): Colombo (Powell coll.). INDIAN OCEAN ISLANDS: Cargados-Caragos Ids.; Mauritius (both von Martens, 1880). PERSIAN GULF: off Muscat, Arabia (BMNH).

Mitra solid Reeve, 1844

(Pl. 279)

Range—Southern Queensland to New South Wales and ? Victoria, Australia.

Remarks—This species is very similar to *M. guttata* Swainson in form, sculpture and colouring, but the whorls are somewhat more inflated in *M. solid*. Juvenile and immature specimens of both species are almost indistinguishable. The similarity of the two species may have been re-

sponsible for Ray's (1954) record of *M. solid* from Bombay, Karachi and the Persian Gulf. The taxonomic status of the two species may have to be re-examined when further material of *M. guttata* becomes available. We have seen only specimens from Southern Queensland and New South Wales, but the species has been reported by Gabriell (1962) from Victoria.

Habitat—On a shell and coral-rubble substratum, from 5 to 70 fathoms.

Description—Shell up to 60 mm (about 2½ inches) in length, elongate-ovate, young specimens cylindrically-ovate, moderately solid. Whorls 7½-9 apart from protoconch of 2½-3 glassy-white or light brown nuclear whorls, spire whorls regularly convex. Sutures distinct and irregularly serrated by descending axial striae. First 2 post-nuclear whorls with 3 or 4 spiral cords, later whorls with finely punctate spiral grooves which number 3-6 on the penultimate and 4-18 on the body whorl. Spire whorls have occasionally fine longitudinal striae which bisect the pits in the grooves and usually vanish past the 4th or 5th spiral groove anteriorly to the suture of the body whorl. Aperture about equal in height or longer than the spire, moderately narrow or open, smooth within; outer lip only moderately thickened and minutely denticulate anteriorly in mature adults. Columella glazed or calloused and with 4 or 5 oblique folds, siphonal canal straight, siphonal fasciole occasionally with a slight twist, siphonal notch distinct; base of shell with 5-8 oblique cords. Brown or orange-brown in colour, ornamented with white spots, blotches or short streaks, usually spotted with white at the sutures; some individuals are uniformly fulvous-brown with hardly a trace of white. Aperture beige, fawn or orange, deep interior sometimes greyish-white, parietal wall brown or fawn, columellar folds whitish.

Measurements (mm)—

length	width	height of aperture	
57.8	18.5	27.2	Off Cape Moreton, Queensland
53.6	18.4	28.0	New South Wales
47.5	17.5	—	Type figure of <i>solid</i>
45.4	16.5	23.8	Holotype of <i>prospora</i>
31.0	14.0	19.0	Sydney Harbour, N.S.W.

Synonymy—

1844 *Mitra solid* Reeve, *Conchologia Iconica*, vol. 4, pl. 3, fig. 18; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 5, pl. 11, figs. 164, 165; 1867 Angas, *Proc. Zool. Soc. London*, p. 194; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 120, pl. 35, fig. 57; 1920 Peile, *Proc. Malac. Soc. London*, vol. 15, p. 93, textfig. 1 (radula); 1970 Cernohorsky, *Bull. Auckland Inst.*

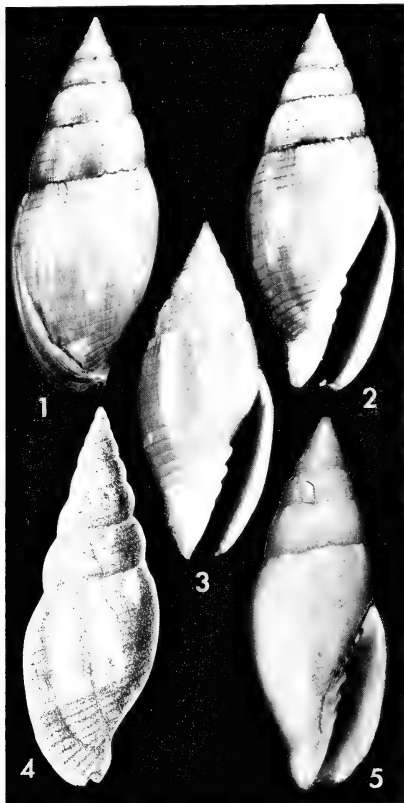


Plate 279. *Mitra (Mitra) solid* Reeve.

Figs. 1, 2. Specimen from Port Jackson, New South Wales, Australia (WOC coll.; 33.4 x 13.0 mm).

Fig. 3. Specimen from Stradbroke Id., Queensland, Australia; immature (WOC coll.; 24.0 x 9.7 mm).

Fig. 4. Lectotype figure of *M. solid* Reeve (from Reeve, 1844, pl. 3, fig. 18).

Fig. 5. Holotype of *M. prospora* (Iredale) from Sydney Harbour, Australia (AMS C-57846; 45.4 x 16.5 mm).

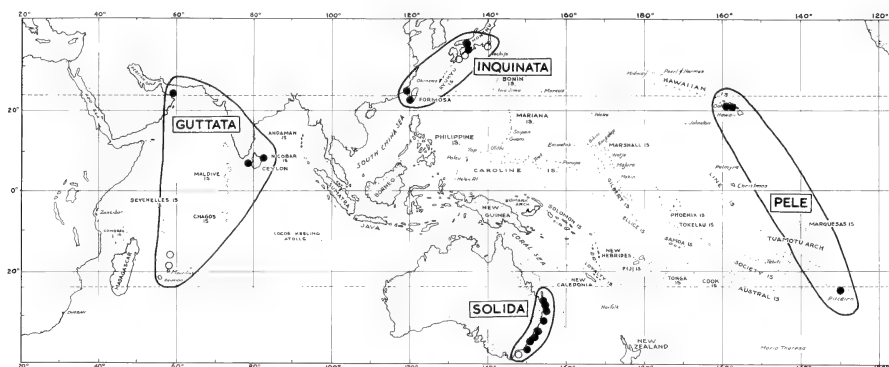


Plate 280. Geographical distribution of the species *Mitra* (*Mitra*) *solida* Reeve, *M. (M.) guttata* Swainson, *M. (M.) inquinata* *inquinata* Reeve, and *M. (M.) pele* Cernohorsky.

Museum, no. 8, p. 66, pl. 1, fig. 8 (figured holotype of *M. prosphora* Iredale).

1929 *Vicimitra prosphora* Iredale, Australian Zoologist, vol. 5, p. 343, pl. 38, fig. 17 (Sydney Harbour, New South Wales, Australia).

1951 *Mitra* (*Vicimitra*) *prosphora* Iredale, Laseron, Rec. Austral. Museum, vol. 22, p. 341, fig. 11 (protoconch).

1957 *Vicimitra prosphora* (sic) Iredale, Cotton, Roy. Soc. South Australia Malac. Section, p. 3; 1959, South Australian Mollusca, p. 385.

1962 *Eumitra prosphora* (Iredale), Gabriel, Mem. Nat. Mus. Melbourne, no. 25, p. 191 (Lakes Entrance, Victoria).

1971 *Pterygia solida* Reeve, Wilson & Gillett, Australian Shells, p. 114, pl. 74, fig. 5.

Types—The type of *M. solida* Reeve has been sold at auction of the Norris collection, and the holotype of *M. prosphora* (Iredale) is in the Australian Museum, Sydney, no. C-57846. Originally described from unknown locality, the species has been correctly reported by Angas (1867) from Middle Head, Port Jackson, New South Wales, Australia, in 5 fathoms, which is designated as the type locality of *M. solida* Reeve.

Nomenclature—Iredale (1929) re-named the species *M. prosphora* on the grounds that *M. solida* was described from unknown locality and differed in sculpture. He did not elaborate on any tangible differences and created the genus *Vicimitra* for his new species. *M. solida* does not differ in form, sculpture or radular characters sufficiently from typical *Mitra* species, e.g. *M. cardinalis*, *M. nubila* etc. to warrant inclusion in a separate genus. Wilson & Gillett's assignment of *M. solida* to the genus *Pterygia* Röding, is inappropriate, since the radula of *M. solida* differs widely in radula and shell characters from species of *Pterygia*.

Records—QUEENSLAND: off Cape Moreton, 30 faths.; N. E. of Cape Moreton, 64-70 faths.; Jumpin Pin Bar, 27 faths.; off Caloundra, 15-20 faths. (all Powell coll.); Stradbroke Island, 25 faths. (Cernohorsky coll.). NEW SOUTH WALES: Lake Macquarie (USNM); Woody Heads, Iluka (Kleckham coll.); Eden (AMNH); Port Jackson (MCZ; AIM); Newcastle (Powell coll.); off Sydney Harbour (Cernohorsky coll.); Twofold Bay (Peile, 1922). VICTORIA: off Lakes Entrance, 20 faths. (Gabriel, 1962).

Mitra inquinata
subspecies *inquinata* Reeve, 1844
(Color pl. 255, figs. 10, 11; pl. 281)

Range—Japan, Formosa and China.

Remarks—The species has been occasionally placed in the subgenus *Nebularia*, but the absence of a strong spiral sculpture would indicate a placement in *Mitra s.str.*

Habitat—Sublittoral, from 10 to 55 fathoms.

Description—Shell up to 75 mm (3 inches) in length, elongate-ovate to fusiformly-elongate, rather solid. Whorls 8-10 apart from protoconch which is generally eroded, spire whorls slightly convex, sutures distinct and slightly irregular. Sculptured with punctate spiral grooves which number from 4-6 on the penultimate and up to 20 on the body whorl; the pits in the grooves produce intervening, slender axial riblets which are generally more prominent anteriorly to the sutures. The base of the shell has about half a dozen oblique spiral cords. Aperture narrow, equal in height or shorter than the spire, smooth within; outer lip thickened, moderately straight or slightly convex and with irregular, small or obsolete blunt denticles at the margin. Columella calloused and with 5 regular, oblique folds, siphonal canal straight, siphonal notch prominent. Base colour white or cream, ornamented with dark red-

dish brown, interrupted spiral lines and axial streaks; aperture and columella white or creamy-white. Periostracum deciduous, thin, tan to blackish.

Measurements (mm)—

length	width	height of aperture	
74.0	20.0	—	Type of <i>wrighti</i>
70.5	20.4	34.4	Holotype of <i>hanleyana</i>
62.8	19.0	30.7	Syntype of <i>inquinata</i>
52.7	14.6	24.3	Lectotype of <i>inquinata</i>
50.2	14.6	24.4	off Tatsugahama, Japan

Synonymy—

- 1844 *Mitra inquitata* Reeve, *Conchologia Iconica*, vol. 2, pl. 5, fig. 29 (no locality given); 1874 Sowerby, *Thesaurus Con-*

- chylionum, vol. 4, p. 5, pl. 11, fig. 168; 1882 Tryon, *Manual Conchology*, vol. 4, p. 118, pl. 34, figs. 40, 44.
1877 *Mitra hanleyana* Dunker, *Malakozool. Blatter*, vol. 24, p. 70 (Japan); 1882 Dunker, *Index Mollusc. Maris Japonici*, p. 51, pl. 2, figs. 6, 7.
1878 *Mitra wrighti* Crosse, *Journal de Conchyliologie*, vol. 26, p. 57, pl. 1, fig. 1 (Japan).
1959 *Mitra (Nebularia) inquitata* Reeve, Kira, *Coloured Illustr. Shells Japan*, rev. ed., p. 88, pl. 34, fig. 5 (juvenile specimen).
1962 *Mitra (Nebularia) hanlayana (sic)* (Dunker), Shuto, *Mem. Fac. Sci. Kyushu University*, vol. 12, p. 62, pl. 13, fig. 9 (Mio-Pliocene of Japan).
1967 *Nebularia inquitata* (Reeve), Habe & Kosuge, *Standard Book Japan. Shells Color*, vol. 3, p. 85, pl. 33, fig. 22; 1971 Kuroda & Habe, *Sea shells of Sagami Bay*, p. 186, pl. 52, fig. 2.

Types—The designated lectotype and 2 syntypes of *M. inquitata* Reeve are in the British Museum (NH) no. 1967784, and the holotype of *M. hanleyana* Dunker is in the Zoological Museum, Berlin. The type of *M. wrighti* Crosse, remained in the private collection of Mrs. Bryce Wright from London, and its whereabouts are unknown. *M. inquitata* has been described from unknown locality, and Dunker's locality indication of "Japan" for *M. hanleyana* is designated as the type locality of *M. inquitata* Reeve.



Plate 281. Figs. 1-4 *Mitra (Mitra) inquitata inquitata* Reeve. Fig. 5. *M. (M.) inquitata buddhaica* Vredenburg.

Figs. 1, 2. Lectotype of *M. inquitata* Reeve (BM (NH) 1967784; 52.7 x 14.6 mm).

Figs. 3, 4. Holotype of *M. hanleyana* Dunker from Japan (ZMB; 70.5 x 20.4 mm).

Fig. 5. Type figure of *M. buddhaica* Vredenburg from the Miocene of Burma (from Vredenburg, 1923, pl. 16, fig. 9; c. 25.0 mm).

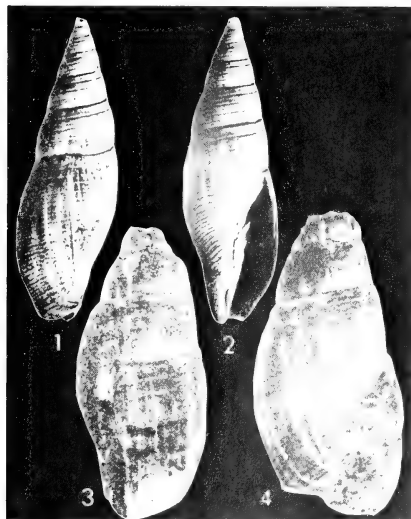


Plate 282. Figs. 1, 2. *Mitra (Mitra) tittabawensis* Vredenburg. Tittabaw. Miocene of Burma (type figure from Vredenburg, 1923, pl. 16, figs. 8a, b; c. 27.0 mm).

Figs. 3, 4. *Mitra (Mitra) singuensis* Vredenburg. Upper Singu beds, Miocene of Burma (type figure from Vredenburg, 1922, pl. 22, fig. 2; c. 20.0 mm).

Records—JAPAN: Fukura, Awaji (MCZ; USNM); Kii (AMNH; DMNH); off Tatsugahama, Kii Province (Cernohorsky coll.); Sagami Bay; Honshu; Shikoku; Kyushu (all from Kuroda & Habe, 1971). CHINA: Spider I., Fokien Province (USNM). FORMOSA: S.W. Taiwan, 100 m (Steiner coll.).

Fossil records—MIO-PLIOCENE: Hagenoshita, Miyazaki Prefecture and Takanabe, Japan (Shuto, 1962).

Mitra inquinata
subspecies *buddhaica* Vredenburg, 1923

(Pl. 281, fig. 5)

Range—Miocene of Burma.

Remarks—Vredenburg compared the incomplete specimen of his species to the living *M. inquinata*, but it was said to differ by its slightly more convex whorls and deeper spiral grooves. The holotype figure of *M. buddhaica* closely resembles the living *M. inquinata* except that the spiral grooves on the body whorl are more numerous. No measurements were given by the author, but the figure indicates a length of 25.0 mm.

Synonymy—

1923 *Mitra buddhaica* Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 272, pl. 16, fig. 9 (Myaukmigon, Kama stage, Burma, M. Miocene; type in Geological Survey of India).

***Mitra tittabweensis* Vredenburg, 1923**

(Pl. 282, figs. 1, 2)

Range—Miocene of Burma.

Remarks—Vredenburg compared his species to *M. granatinaeformis* Martin, but separated his species on the basis of more delicate, thinner grooves, their tendency to multiply by intercalation and the absence of a stepped disposition of the suture. The species is more closely related to *M. inquinata buddhaica* Vredenburg.

No measurements were given, but the figure indicates a length of 27.0 mm.

Synonymy—

1923 *Mitra tittabweensis* Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 273, pl. 16, figs. 8a, b (Kyaungon; Myaukmigon; Tittabwe and probably Thanga, Burma, M. Miocene; Tittabwe is here selected as the type locality. The type is in the Geological Survey of India).

***Mitra singuensis* Vredenburg, 1922**

(Pl. 282, figs. 3, 4)

Range—Miocene of Burma.

Remarks—Vredenburg did not diagnose the fragmented specimen but compared his new species to the German Oligocene *M. mettei* Giebel. *M. singuensis* is in many ways similar to *M. inquinata buddhaica* from the same deposits, has a similar whorl formation and spiral grooves,

but the whorls are shorter and the body whorl is more ventricose.

No measurements were given, but the figure indicates a length of 20.0 mm.

Synonymy—

1922 *Mitra singuensis* Vredenburg, Rec. Geol. Surv. India, vol. 53, p. 340, pl. 22, fig. 2a, b (Upper Singu beds, Burma, Miocene; type in Geological Survey of India).

***Mitra pele* Cernohorsky, 1970**

(Pl. 283)

Range—Polynesia and the Hawaiian Islands.

Remarks—This rare species has been confused with the S. E. Australian *M. carbonaria* Swainson, and the West African *M. nigra* (Gmelin). *M. pele* is a deepwater species which has not been recorded outside the Polynesian region. The species reported as *M. pele* from Sagami Bay, Japan, by Kuroda & Habe (1971), is a juvenile specimen of *M. chinensis* Griffith & Pidgeon.

Habitat—On a stone and coral-rubble substratum, from 17 to 125 fathoms.

Description—Shell up to 50 mm (2 inches) in length, elongate-ovate, thick and solid, sutures distinct but not deep. Teleconch of about 7 almost flat-sided whorls, protoconch missing; sculptured with smooth and thin, but sometimes minutely punctate spiral grooves which number 8-10 on the penultimate and up to 30 on the body whorl.

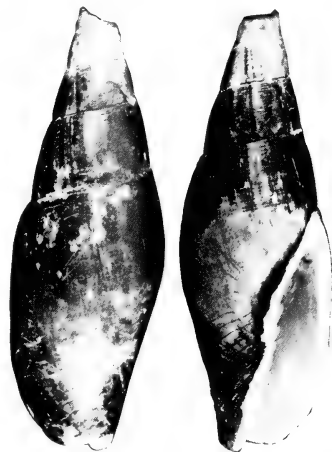


Plate 283. *Mitra (Mitra) pele* Cernohorsky. 1 mi. N.W. of Pitcairn Island, Pacific Ocean, 55-70 fms. (holotype USNM 679608; 41.1+ x 14.5 mm).

Under magnification, close-set, fine longitudinal striae are discernible on the shell; base of shell with about a dozen oblique spiral cords. Aperture moderately narrow, about equal in height to the spire, smooth and white within; outer lip thickened and simple. Columella white and calloused, parietal wall with a white callosity, columella with 5-7 close-set and oblique folds; siphonal canal straight, siphonal notch distinct. Adult shell uniformly tan under a thin, dark brown periostracum, aperture and columella white; juvenile shells are light orange-brown on the anterior half of the last whorl and dark brown elsewhere.

Measurements (mm)—

length	width	height of aperture	
49.0±	—	—	off Waikiki, Hawaiian Ids.
46.4	15.0	22.8	off Keeki lagoon, Hawaiian Ids.
41.1+	14.5	22.7	Holotype of <i>pele</i>
39.4	14.5	21.8	Paratype of <i>pele</i>

Synonymy—

1933 *Mitra nigra* (Chemnitz), Schröter, Dautenberg & Bouge, *Journal de Conchyliologie*, vol. 77, pt. 2, p. 178. (non *Voluta nigra* Gmelin, 1791).

1960 *Mitra nigra* Schröter, J. Cate, Veliger, vol. 3, p. 49 (non *Voluta nigra* Gmelin, 1791).

1962 *Mitra nigra* Gmelin, Abbott, Veliger, vol. 4, p. 213 (non *Voluta nigra* Gmelin, 1791).

1970 *Mitra pele* Cernohorsky, *Nautilus*, vol. 83, p. 99, figs. 3-5 (Pitcairn Island).

Types—The holotype of *M. pele* is in the National Museum of Natural History, Washington, no. USNM 679608. The type locality is 1 mile N.W. of Pitcairn Island, Pacific Ocean.

Records—PITCAIRN ISLAND: 1 mi. N.W. of Pitcairn I., 55-70 faths. (USNM). HAWAIIAN ISLANDS: off Waikiki, Oahu, 100 ft.; Keeki Lagoon, Oahu (BPBM); off Keeki Lagoon entrance, Oahu, 125 faths. (Cross coll.).

Mitra chinensis Griffith and Pidgeon, 1834

(Pl. 284)

Range—Indonesia and India to China and Japan. South Africa.

Remarks—A very variable species in size, form and colour. *M. chinensis* has been recorded from the northern hemisphere, ranging along the coast of India and China. Adams' locality indication of "Australia" for *M. sacerdotalis* is obviously erroneous. The species is easily recognized by the bulging and strong columellar folds and the white callosity on the parietal wall adjoining the junction of the outer lip.

Habitat—Under rocks, intertidal zone to a depth of 30 fathoms.

Description—Shell up to 75.0 mm (3 inches) in length, elongate-ovate, body whorl occasionally ventricose, sutures distinct. Whorls 7-9 apart from an eroded protoconch, spire whorls slightly convex and occasionally weakly subangulate at the sutures, which are prominent, irregular and slightly ragged. Sculptured with minutely punctate or macroscopically striate spiral grooves which number from 4-10 on the penultimate whorl and from 2-10 on the body whorl; in some specimens, the spiral grooves are confined to the shoulder of the body whorl, the centre is smooth and the base has 11-20 oblique cords; in fresh specimens numerous and crowded longitudinal

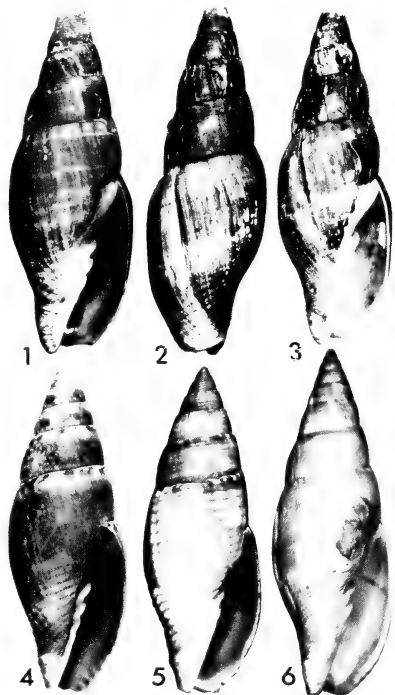


Plate 284. *Mitra (Mitra) chinensis* Griffith and Pidgeon.

Fig. 1. Lectotype of *M. chinensis* Griffith and Pidgeon (BM (NH) 1967708; 58.6 x 20.4 mm).

Figs. 2, 3. Specimen from China; with periostracum (BM (NH); 60.1 mm).

Figs. 4, 5. Specimens from Bombay, India; immature (Steiner coll.; fig. 4 = 37.0 x 13.3 mm; fig. 5 = 34.0 x 12.0 mm).

Fig. 6. Lectotype of *M. sacerdotalis* A. Adams (BM (NH) 1967874; 67.1 x 22.4 mm).

striae are visible under magnification. Aperture moderately narrow, equal in height or only slightly longer than the spire, smooth within; outer lip regularly convex or subangulate, slightly thickened at the margin and smooth. Columella with a callosity on the posterior of the parietal wall, columella calloused, and with 4 or 5 strong and usually bulging oblique folds. Siphonal canal somewhat produced in adult specimens, straight or slightly recurved, siphonal notch distinct. Variable in colour, usually tan to dark brown in colour, ornamented with small or large areas of cream or white, occasionally with small white spots at the sutures; the pattern is obscured by a dark brown periostracum and some specimens have dark brown spiral lines. The parietal wall is brown, the callosity white or light fawn and the columellar folds and anterior callus are brilliant white.

Measurements (mm)—

length	width	height of aperture	
74.7	25.4	37.9	Syntype of <i>sacerdotalis</i>
67.1	22.4	34.6	Lectotype of <i>sacerdotalis</i>
58.6	20.4	29.0	Lectotype of <i>chinensis</i>
41.5	15.0	22.0	St. Martin's I., Burma
37.0	13.3	19.6	Bombay, India

Synonymy—

?1824 *Mitra strigata* Swainson, Quart. Journal Sci. Arts, vol. 17, no. 33, p. 37 (no locality given); 1829, Zoological Illustrations, ser. 2, vol. 1, pl. 19, figs. 1, 1 (dubious name).

1834 *Mitra chinensis* Griffith & Pidgeon, Animal Kingd. Baron Cuvier, Moll. & Radiata, vol. 1w, pl. 40, fig. 2 (no locality given); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 33, pl. 11, fig. 33 (Indian Ocean); 1839 Gray, Zool. Capt. Beech. Voy. Blossom, p. 135, pl. 35, fig. 2 (China); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 5, fig. 36; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 5, pl. 6, fig. 81; 1882 Tryon, Manual of Conchology, vol. 4, p. 120, pl. 36, figs. 65, 66; 1942 Yen, Proc. Malac. Soc. London, vol. 24, p. 236, pl. 24, fig. 172 (figured lectotype); 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 66, pl. 1, figs. 11, 12.

1853 *Mitra sacerdotalis* A. Adams, Proc. Zool. Soc. London, for 1851, p. 138 (Australia = error!); 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 5, pl. 6, fig. 79; 1882 Tryon, Manual Conchology, vol. 4, p. 120, pl. 35, fig. 62.

Types—The two immature syntypes of *M. chinensis* Griffith and Pidgeon, are in the British Museum (NH) no. 1967708; the larger, 58.6 mm long specimen, which has been illustrated by Griffith and Pidgeon (1834) and by Yen (1942), is here selected as the lectotype of *M. chinensis*. The lectotype, here designated, and 2 syntypes of *M. sacerdotalis* A. Adams, are in the British Museum (NH) no. 1967874. The species was described from unknown locality, and Gray's (1839) subsequent indication of China, which is here further restricted to Amoy, China, is designated as the type locality (specimens in USNM).

Nomenclature—*Mitra strigata* Swainson, is most probably an earlier name for this species, but since the type is lost and some doubt remains as to what species Swainson's illustration represents, the name *M. strigata* is treated as a dubious name.

Records—INDONESIA: Miri, Sarawak, Borneo (Hill coll.; Salisbury coll.). INDIA: Bombay (Steiner coll.). BURMA: St. Martin's Island, Arakan coast (Steiner coll.). CHINA: HONG KONG: Lantea I. (DMNH); Yenting, Amoy (both USNM). JAPAN: ? Honshu; Sagami Bay; Shikoku (Kuroda & Habe, 1971). SOUTH AFRICA: Natal; Durban Bay (both DMNH).

Fossil records—MIOCENE: Garo Hills, Assam, India (Mukerjee, 1939)?

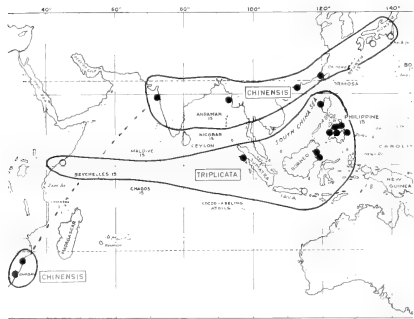


Plate 285. Geographical distribution of the species *Mitra* (*Mitra*) *chinensis* Griffith and Pidgeon and *M. (M.) triplicata* von Martens.



Plate 286. *Mitra* (*Mitra*) *semicincta* K. Martin. Kali Puru, Nanggolan beds, U. Eocene of Java (type figure from K. Martin, 1931, pl. 3, fig. 4; 35.0 mm).

Mitra semicincta K. Martin, 1931

(Pl. 286)

Range—Upper Eocene of Java, Indonesia.

Remarks—The species is probably the ancestor of the Miocene *M. subscrobiculata* d'Orbigny. It has the same fusiform shape of the spire whorls and the spiral sculpture is confined to the posterior part of the sutures.

The length of the incomplete holotype is 35.0 mm.

Synonymy—

1931 *Mitra* (*s. str.*) *semicincta* Martin, Wet. Meded. Dienst Mijnbouw Ned.-Indie, no. 18, p. 18, pl. 3, fig. 4 (Kali Puru, Nanggolan beds, Java, Indonesia, U. Eocene; type in Rijksmuseum, Leiden).

Mitra subscrobiculata Orbigny, 1852

(Pl. 287)

Range—Miocene of India and Burma; Pliocene of Indonesia.

Remarks—Vredenburg (1923, 1925) considered *M. subscrobiculata* to be only a variant of *M. chinensis* Griffith and Pidgeon. The two species appear to be quite distinct in form and sculpture and are considered here separable taxa. *M. sub-*

scrobiculata attains a length of 90.0 mm (about 3½ inches), is elongate-fusiform in shape, the spire whorls are only slightly convex and weakly shouldered near the sutures. The early spire whorls have 4-6 spiral grooves which produce slightly elevated, flattened cords which usually become obsolete on the anterior half of the penultimate and the centre of the body whorl; on the last whorl there are usually 2-4 cords at the shoulder, the centre of the whorl is smooth or weakly spirally grooved, and the base is obliquely corded. The aperture is narrow and elongate, the columella is calloused and has 4 folds, and the base of the siphonal canal is usually twisted. The length of the holotype is 46.3 mm.

Synonymy—

1840 *Mitra subscrobiculata* J. de C. Sowerby, Trans. Geol. Soc. London, N.S., vol. 5, p. 329 and explanations to plate, pl. 26, fig. 23 (Soomrow, Gaj of Kachh, India, L. Miocene; holotype in the Dept. of Palaeontology, B.M. (NH), no. GG-19747-old no. 10055 [non *Voluta subscrobiculata* Brocchi, 1814]).

1852 *Mitra subscrobiculata* Orbigny, Prodr. Paleont. strat. Universelle, vol. 3, p. 54, (substitute name for *M. scrobiculata* J. de C. Sowerby, 1840).

1915 *Mitra junghuhnii* Martin, Tesch in Wanner, Paläontologie von Timor, vol. 5, p. 44, pl. 79, figs. 94a, b (non K. Martin, 1880).

1923 *Mitra chinensis* var. *subscrobiculata* Orbigny, Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 271; 1925, Mem. Geol. Surv. India, vol. 50, pt. 1, p. 145; 1939 Mukerjee, Mem. Geol. Surv. India, N.S., vol. 28, Mem. no. 1, p. 66.

1923 *Mitra iravadica* Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 272, pl. 16, figs. 4a, b (Migyaungye, Burma, M. Miocene—here designated as type locality; type-specimen probably in the Geological Survey of India, c. 46.0 mm).

Records—INDIA: Soomrow, Gaj of Kachh (Sowerby, 1840); Tyra River near Rampur, Gaj of Kachh; North of Naliya, Gaj of Kachh; near Bagmara, Garo Hills, Assam, all Miocene (Vredenburg, 1925). BURMA: Migyaungye; Myaukmigon; Myautin; Tittabwe, all M. Miocene (Vredenburg, 1923—as *M. iravadica*). INDONESIA: Mota Talau, Atamboea, Timor, Pliocene (Tesch in Wanner, 1915).

Mitra birmanica Vredenburg, 1923

(Pl. 288, figs. 1, 2)

Range—Miocene of Burma.

Remarks—The author did not diagnose the species and only compared it with the living *M. rubiginosa* Reeve and the European Mio-Pliocene species *M. ataca* and *M. peracuta* Bellardi. The figured type is an immature specimen which has a certain relationship with *M. nivea* (Broderip), but has a coarser spiral sculpture, especially on the spire whorls.

No measurements were given by the author, but the figure indicates a length of 30.5 mm.

Synonymy—

1923 *Mitra birmanica* Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 272, pl. 16, figs. 5a, b (Thanga, Burma, M. Miocene; type in Geological Survey of India).



Plate 287. *Mitra* (*Mitra*) *subscrobiculata* d'Orbigny.

Figs. 1, 2. Holotype of *M. subscrobiculata* d'Orbigny from Soomrow, Gaj of Kachh, Miocene of India (Dept. Palaeont. BM (NH) GG-19747—old no. 10055; 46.3 mm) [photo courtesy of C. P. Nuttall, BM (NH)].

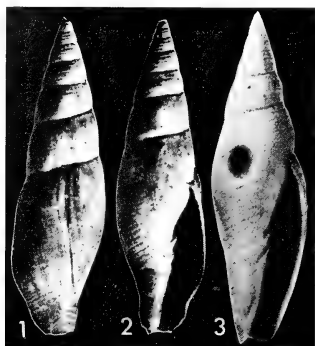


Plate 288. Figs. 1, 2. *Mitra (Mitra) birmanica* Vredenburg. Holotype from the Miocene of Burma; immature specimen (from Vredenburg, 1923, pl. 16, figs. 5a, b; c. 30.5 mm).

Fig. 3. *Mitra (Mitra) loochooensis* MacNeil. Holotype from Okinawa, Miocene of the Ryukyu Ids.; juvenile specimen (from MacNeil, 1960, pl. 4, fig. 26; 19.3 x 6.0 mm).

Mitra loochooensis MacNeil, 1960

(Pl. 288, fig. 3)

Range—Miocene of Okinawa, Ryukyu Islands.

Remarks—The author compared his species with *M. birmanica* Vredenburg from the Miocene of Burma. Both these species were described from juvenile specimens and resemble juvenile and immature individuals of *M. nicea* Broderip. The specimen figured by MacNeil on plate 4, fig. 33, is probably not the same species.

The dimensions of the holotype are length 19.3 mm, width 6.0 mm.

Synonymy—

1960 *Mitra (Fusimitra) loochooensis* MacNeil, U.S. Geol. Surv. Prof. Paper, no. 339, p. 95, pl. 4, figs. 26-27, 32-33 (Yonabaru clay member, Okinawa, Ryukyu Islands, Miocene; holotype in National Museum of Natural History, Washington, no. USNM 562730).

Mitra quilouensis Dey, 1962

(Pl. 289)

Range—Miocene of India.

Remarks—The original description reads:

"Shell of medium size, thick, smooth in appearance except for occasional axial wrinkles and delicate spiral lines; whorls 9, the 2 nuclear and first postnuclear ones being minute and somewhat flat; suture not deeply impressed; aperture narrow, longer than the spire; siphonal notch wide; fasciole fairly conspicuous; columella with 4 strong plaits; increasing in strength posteriorly;



Plate 289. *Mitra (Mitra) quilouensis* Dey, Quilon, Kerala, Miocene of India. (type figure from Dey, 1962, pl. 4, figs. 1, 2; 47.0 x 15.0 mm).

parietal wall and columellar margin coated with a shining porcellaneous layer of callus.

This species is related to *Mitra episcopalis* Linne (= *M. mitra*), but has a less conspicuous siphonal fasciole, and equidistant columellar plaits. In *M. episcopalis* (= *M. mitra*) the plaits are somewhat oblique, and the anterior ones are nearer together than the posterior ones; the margin of the outer lip is not crenate."

The measurements of the holotype are length 47.0 mm, width 15.0 mm.

Synonymy—

1962 *Mitra quilouensis* Dey, Mem. Geol. Surv. India, N.S., vol. 36, p. 85, pl. 4, figs. 1-3 (Quilon, Kerala, India, Miocene; holotype in Geological Survey of India, no. G.S.I. 16465).

Mitra triplicata von Martens, 1904

(Plate 290)

Range—East Africa to Indonesia and the Philippines.

Remarks—This uncommon, deep water species varies a great deal in obesity, length of aperture and prominence of spiral sculpture. The recently described *Mitra verweyi* Knudsen, falls well within the variational range of *M. triplicata*.

Habitat—In blue clay and mud, from 260 to 745 fathoms, at water temperatures ranging from 43° to 53° F.

Description—Shell up to 68 mm in length (about 2¾ inches) in length, elongate-ovate, slender or sometimes inflated, rather light in weight. Mature whorls 8-9 apart from 1½-2 conical nuclear whorls, spire whorls convex. Sculptured with pitted spiral grooves which number from 6-14 on the penultimate and from 5-29 on the body whorl; early whorls with axial growth-striae which usu-



Plate 290. *Mitra (Mitra) triplicata* von Martens.

Figs. 1, 2. Holotype of *M. triplicata* von Martens from N. of Brawa, Somali Republic, East Africa, 1362 m (ZMB; 47.0 x 16.5 mm) [photo courtesy of R. Kilias, ZMB].

Fig. 3. Holotype of *M. verweyi* Knudsen from Bali Sea, Indonesia, 200 m (from Knudsen, 1970, pl. 4, fig. A; 67.3 x 22.0 mm).

Fig. 4. Specimen from off Mabul Id., Sibuko Bay, Borneo, 260 fms.; broad, sculptured form (USNM 239084; 58.0 x 22.0 mm).

Fig. 5. Specimen from Iligan Bay, Mindanao, Philippines Ids.; smooth, slender form (USNM 238804; 55.5 x 15.5 mm).

ally become obsolete on the last 2 whorls. Two to four spiral cords at the sutures are usually prominent and in some individuals the spiral sculpture is obsolete on the last 2 whorls; the lower half of the body whorl has 7-15 spiral cords. Aperture equal in height or longer than the spire, wide or moderately narrow, smooth within; outer lip moderately thickened and smooth, columella with a calloused shield in adults and with 3-5 oblique folds, siphonal notch distinct. Uniformly tan to dark brown in colour, aperture and columellar callus white. Periostracum dark brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
67.3	22.0	35.1	Holotype of <i>verweyi</i>
58.0	19.7	29.5	Mabul I., Borneo
55.5	15.6	25.8	Mindanao, Philippines
47.0	16.5	26.0	Holotype of <i>triplicata</i>
43.7	14.4	23.0	off Sumatra, Indonesia

Synonymy—

1904 *Mitra (Phaeomitra) triplicata* von Martens, Wiss. Ergeb. Deut. Tiefsee-Exped. "Valdivia", vol. 7, p. 106, pl. 3, fig. 17 (N of Brawa, Somali Republic, E. Africa); 1904 Thiele, *ibid.*, p. 169, pl. 9, figs. 63, 63a (radula).

1970 *Mitra verweyi* Knudsen, Zool. Meded. Rijksm. nat. Hist. Leiden, vol. 45, p. 22, pl. 4, figs. A-C (Bali Sea, Indonesia, 7°33'S & 114°36'E, 200 metres, bottom mud).

1970 *Mitra triplicata* Martens, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 35, pl. 2, figs. 2, 3.

Types—The holotype of *M. triplicata* von Martens, is in the Berlin Museum and the holotype of *M. verweyi* Knudsen, in the Rijksmuseum van Natuurlijke Historie, Leiden. The type locality for *M. triplicata* is station 258, N. of Brawa, Somali Republic, Lat. 2°58'N and Long. 46°50'E, in 1362 metres, in blue clay and mud.

Records—EAST AFRICA: N. of Brawa, Somali Republic (v. Martens, 1904). INDONESIA: off Mabul I., Sibuko Bay, Borneo, 260 fathoms, at 45.7°F; S. of Silungan I., Sibuko Bay, Borneo, 305 fms., at 43.3°F; Pulau Melia, off Sumatra (all USNM). PHILIPPINE ISLANDS: Iligan Bay, Mindanao, 700 fms.; off Point Binuni, Iligan Bay, 505 fms.; off Balicasag I., Bohol I., 432 fms.; Sogod Bay, Leyte, 502 fms.; off Liangan, Mindanao, 445 fms., at 52.8°F; off Santiago, W. Luzon, 280 fms., at 46.8°F (all USNM).

Mitra nivea (Broderip, 1836)

(Pl. 291)

Range—Japan to the Solomon Islands and Polynesia.

Remarks—*M. nivea* is a rare species which appears to be confined to the Pacific Ocean. It has occasionally been placed in *Tiara* (= *Cancilla*) or *Scabricola* but the radula is typically mitrine. The following species, i.e. *M. ancillides* Broderip, is very similar in all respect except size, and could prove to be a dwarf individual of *M. nivea* when more material of both species becomes available.

Habitat—On a sand substratum, from 10 to 55 fathoms.

Description—Shell up to 90 mm (about 3½ inches) in length, fusiformly-elongate, moderately solid. Whorls 8-9 apart from 2-3 glassy-white nuclear whorls, spire whorls slightly convex, sutures distinct. First 2 postnuclear whorls fenestrate through bisecting spiral and axial striae in smaller specimens, axial striae weakening on later whorls; on the last 2 whorls the spiral grooves



Plate 291. *Mitra (Mitra) nivea* (Broderip).

Fig. 1. Lectotype from Anaa Id., Tuamotu Archipelago; immature (BM (NH) 1967924; 48.4 x 14.0 mm).

Fig. 2. Specimen from Anaa Id., Tuamotu Archipelago (BM (NH) 1967924; 69.0 x 21.3 mm).

Figs. 3, 4. Holotype of *M. norrisii* Reeve (BM (NH) 1967917; 86.4 x 25.3 mm).

Fig. 5. Specimen from Marau Sound, Guadalcanal, Solomon Ids.; immature (WOC coll.; 40.0 x 11.6 mm).

become more prominent and are minutely pitted in the interstices. Spiral striae number from 12-25 on the penultimate and from 35-70 on the body whorl; spiral striae become slightly more prominent, oblique cords towards the base of the shell. Aperture longer than the spire, narrow and smooth within; outer lip convexly elongate in immature specimens but slightly angulate and more thickened in adults and obsoletely denticulate anteriorly. Columella not calloused and with 5 or 6 oblique folds, siphonal fasciole short, thickened and slightly twisted in adults but straight in immature specimens, siphonal notch distinct. Uniformly white to fawn in colour, occasionally mi-

nutely spotted at the sutures and grooves lined with dark brown; some immature specimens have 2 broad, orange-fawn transverse bands on the body whorl, interior of aperture white or flesh in colour, columella fawn, folds white.

Measurements (mm)—

length	width	height of aperture	
86.4	25.3	45.0	Holotype of <i>norrisii</i>
69.0	21.3	37.0	Anaa I., Tuamotus
54.7	14.6	28.9	Syntype of <i>nivea</i> (juvenile)
48.4	14.0	26.3	Lectotype of <i>nivea</i>
45.4	13.4	23.0	Tosa Bay, Japan (juvenile)
40.0	11.0	21.7	Solomon Ids. (juvenile)

Synonymy—

1836 *Tiara nivea* Broderip, Proc. Zool. Soc. London, pt. 3, p. 195 (Anaa Island).

1844 *Mitra nivea* Reeve, Conchologia Iconica, vol. 2, pl. 6, fig. 41; 1873 Garrett, Proc. Zool. Soc. London, p. 839; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 8, pl. 6, fig. 77; 1882 Tryon, Manual of Conchology, vol. 4, p. 137, pl. 40, fig. 167; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 35, pl. 2, fig. 4 (shell), textfig. 49 (radula).

1844 *Mitra norrisii* Reeve, Conchologia Iconica, vol. 2, pl. 1, fig. 6 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 8, pl. 5, fig. 68; 1882 Tryon, Manual of Conchology, vol. 4, p. 137, pl. 40, fig. 166.

1880 *Mitra nevai* (sic) Swainson, Garrett, Journal of Conchology, vol. 3, p. 21.

1907 *Mitra (Scabricula) nivea* Swainson, Couturier, Journal de Conchyliologie, vol. 55, p. 135.

1933 *Mitra (Scabricula) nivea* Swainson, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 77, p. 179.

?1939 *Mitra (Tiara) nivea* (Swainson), Oostingh, Ing. Nederl. Indie, vol. 6, p. 9, pl. 10, figs. 178a, b.

1971 *Vicimitra nivea* (Broderip), Kuroda & Habe, Shells of Sagami Bay, p. 189, pl. 53, figs. 11, 12.

Types—There are 3 syntypes of *M. nivea* (Broderip) in the British Museum (NH) no. 1967924; the largest and very adult 69.0 mm long specimen is obviously not a *bona fide* syntype since Broderip would not have failed to select the most perfect specimen. His given measurements, however, agree within a few mm with the other two, more immature syntypes. We therefore select the 48.4 mm long syntype as the lectotype of *M. nivea* Broderip. The holotype of *M. norrisii* Reeve, a mature adult, is also in the British Museum (NH) no. 1967917. This specimen was discovered in the Calvert Collection and sent to the British Museum in 1967 by R. T. Abbott. This type locality is Anaa Island, Tuamotu Archipelago.

Records—JAPAN: Honshu, Sagami Bay; Shikoku; Kyushu (Kuroda & Habe, 1971); off Cape Ashizuru, Tosa Bay, Shikoku (Cernohorsky coll.). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Cernohorsky coll.). COOK ISLANDS: Rarotonga (Garrett, 1873). SOCIETY ISLANDS: Fare Ute Point, Papeete, Tahiti (USNM). TUAMOTU ISLANDS: Anaa

Island (DMNH; MCZ). GAMBIE ISLANDS: Aukena (Couturier, 1907).

Fossil records—?PLIOCENE: Tjiidjow, Bantam, Java, Indonesia (Oostingh, 1939).

***Mitra ustulata* Reeve, 1844**

(Pl. 292)

Range—Red Sea to Polynesia and the Hawaiian Islands.

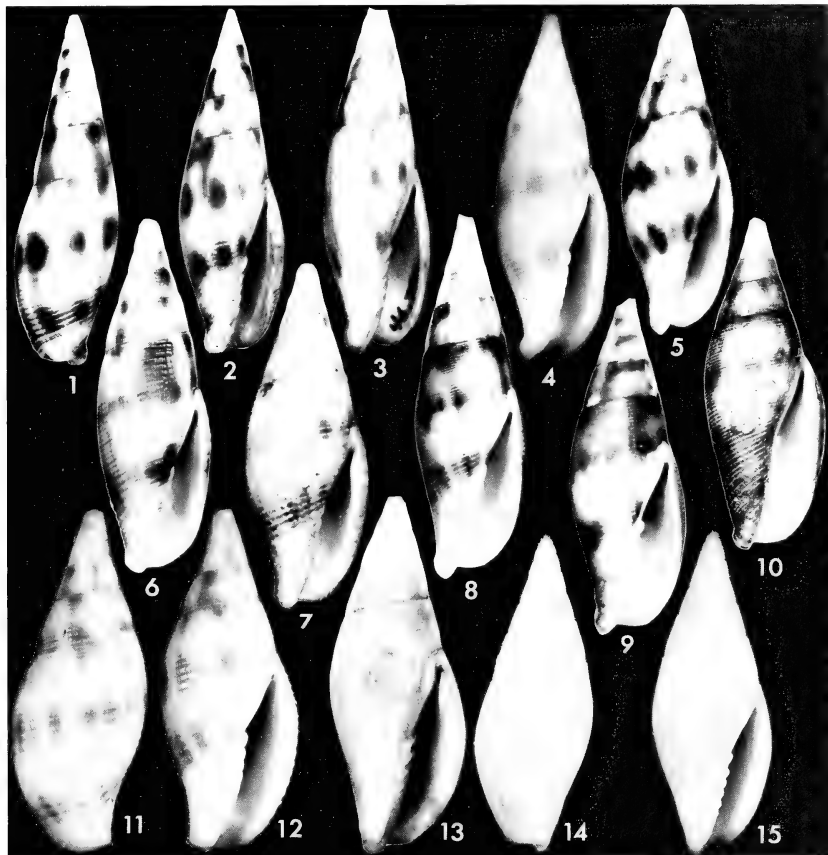


Plate 292. *Mitra (Mitra) ustulata* Reeve.

Figs. 1, 2. Lectotype of *M. ustulata* Reeve; slender form (BM (NH) 1967918; 40.2 x 12.0 mm).

Fig. 3. Holotype of *M. kamehameha* Pilsbry from Honolulu Harbour, Hawaiian Ids. (ANSP 46793; 49.4 x 15.2 mm).

Fig. 4. Specimen from Koror Id., Palau Ids. (WOC coll.; 43.6 x 14.0 mm).

Fig. 5. Lectotype of *M. ignobilis* Reeve from Ticao Id., Philippine Ids.; intermediate form (BM (NH) 1967783; 35.3 x 12.3 mm).

Fig. 6. Syntype of *M. ignobilis* Reeve; slender, corded form (BM (NH) 1967783).

Fig. 7. Syntype of *M. ignobilis* Reeve; broad, corded form

(BM (NH) 1967783; 37.3 x 13.6 mm).

Figs. 8, 9. Specimens from Aden (NMW; fig. 8 = 45.8 x 14.3 mm; fig. 9 = 36.9 x 12.6 mm).

Fig. 10. Specimen from Manila, Philippine Ids.; broad form (NMW; 39.2 x 14.2 mm).

Figs. 11, 12. Specimen from the Bay of Islands, Suva Harbour, Fiji Ids.; broad, corded form (WOC coll.; 42.0 x 16.7 mm).

Fig. 13. Holotype of *M. petrosa* Sowerby; broad, albino form (BM (NH) 1879.2.26.136; 37.6 x 13.6 mm).

Figs. 14, 15. Specimen from Marau Sound, Guadalcanal, Solomon Ids.; broad, albino form (Gower coll.; 44.7 x 16.7 mm).

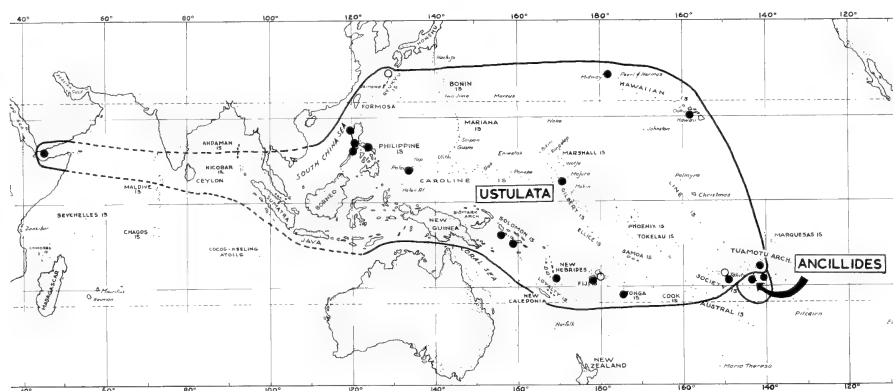


Plate 293. Geographical distribution of the species *Mitra* (*Mitra*) *ustulata* Reeve, and *M. (M.) ancillides* Broderip.

Remarks—The species is highly variable in form and sculpture. As in other Mitridae, slender and broad forms of *M. ustulata* are found, often in the same locality, and *M. ustulata* and *M. ignobilis* should be treated as sympatric variants and not allopatric subspecies. The numerous spiral striae are not confined to the slender form *ustulata* but are also present in individuals of the broad form *ignobilis*. *M. petrosa* Sowerby, is a broad, albino form of *M. ustulata*.

Habitat—Sublittoral, on a coral-sand and shell-rubble substratum.

Description—Shell up to 53 mm (about 2 inches) in length, elongate-ovate to fusiformly-ovate, rather solid. Whorls 7-8 apart from protoconch of 2 smooth, conical nuclear whorls, spire whorls flat-sided or slightly convex. Sutures distinct and fairly regular, spire slightly concave on broad specimens. Sculptured with shallow or moderately deep spiral grooves which may be finely punctate, especially on the spire whorls; depending on the depth of the spiral grooves, resulting cords are either flat or slightly stepped, close-set or wide-spaced, and number 8-24 on the penultimate and 25-60 on the body whorl. In some individuals, very fine longitudinal striae descend on the whorls and form macroscopic lirae in the interstitial grooves. Aperture narrow, equal in height or longer than the spire, smooth within; outer lip thickened and simple, convexly elongate or prominently convex. Columella not calloused and only slightly glazed and with 6-8 close-set, oblique folds. Siphonal canal straight or slightly recurved, siphonal fasciole distinct. White to

cream in colour, spire whorls ornamented with irregular dark brown spots and streaks, body whorl with dark reddish-brown blotches which are usually arranged in 3 interrupted transverse bands; some individuals are pure white, lacking any trace of brown ornamentation. Interior of aperture creamy-white, yellow or light orange-yellow, columellar folds white.

Measurements (mm)—

length	width	height of aperture	
50.5	16.8	26.8	Nuku'alofa, Tonga
49.4	15.2	26.3	Holotype of <i>kamehameha</i>
49.0	15.0	—	Type of <i>mosaica</i>
45.8	14.3	23.4	Aden
44.7	16.7	22.7	Guadalcanal, Solomon Ids. (albino form)
40.2	12.0	19.8	Lectotype of <i>ustulata</i>
39.2	14.2	21.0	Manila, Philippines
37.6	13.6	21.0	Holotype of <i>petrosa</i>
35.3	12.3	20.6	Lectotype of <i>ignobilis</i>

Synonymy—

- 1844 *Mitra ustulata* Reeve, *Conchologia Iconica*, vol. 2, pl. 13, fig. 89 (no locality given); 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 17, pl. 14, fig. 227; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 31; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 119, pl. 35, fig. 51; 1962 J. Cate, *Veliger*, vol. 4, p. 142, pl. 3, fig. 1 (figured holotype of *M. kamehameha* Pilsbry).
- 1844 *Mitra ignobilis* Reeve, *Conchologia Iconica*, vol. 2, pl. 20, fig. 152 (Ticao Philippines); 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 17, pl. 8, fig. 110; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 18; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 119, pl. 35, fig. 52; 1964 Weaver, *Hawaiian Shell News*, vol. 12, no. 10, p. 1, figs. 5, 6.
- 1864 *Mitroides ignobilis* Reeve, A. Adams, *Journ. Linn. Soc. London*, vol. 7, p. 199 (Mososeki, Japan).
- 1869 *Mitra mosaica* Issel, *Malac. Mar. Rosso Ric. Zool. Paleont.*, p. 264, pl. 3, fig. 7 (Red Sea; Pleistocene).
- 1874 *Mitra petrosa* Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 18, pl. 17, fig. 314 (no locality given) [albino form].
- 1921 *Mitra kamehameha* Pilsbry, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 72, p. 309, 313, pl. 12, fig. 23 (Honolulu

Harbour); 1964 Weaver, Hawaiian Shell News, vol. 12, no. 8, p. 1, figs. 3, 4 (figured holotype).
 1965 *Mitra contracta* Swainson, Cernohorsky, Veliger, vol. 8, p. 84, pl. 13, fig. 9 (non Swainson, 1820).
 1969 *Nebularia abbatis* (Dillwyn), Hitachi, Venus: Japan. Journal Malacology, vol. 28, p. 153, textfig. 1 (Nase, Amami-Oshima I., Japan) [non *Voluta abbatis* Dillwyn, 1817].

Types—The following types are in the British Museum (NH): the designated lectotype and 1 syntype of *M. ustulata* Reeve, B.M. (NH) no. 1967918, the designated lectotype and 2 syntypes of *M. ignobilis* Reeve, B. M. (NH) no. 1967783, and the holotype of *M. petrosa* Sowerby, B.M. (NH) no. 1879.2.26.136. The holotype of *M. kamehameha* Pilsbry, is in the Academy of Natural Sciences, Philadelphia, no. ANSP 46793, and the type of *M. mosaica* Issel, is probably in the Museum of Pisa, Italy. *M. ustulata* has been described from unknown locality, and Garrett's (1880) first correct record of Kio Island, Fiji Islands, is designated as the type of locality of *M. ustulata*.

Nomenclature—Considerable confusion existed between the various forms described as distinct species, and the writer (1965) unwittingly added to the confusion by considering *M. ustulata* conspecific with *M. contracta* Swainson, a superficially similar but quite distinct species. The forms *mosaica* Issel and *kamehameha* Pilsbry, have been based on slender, *ustulata*-like specimens, while *ignobilis* Reeve and *petrosa* Sowerby, were described on the basis of broad forms. The latter form *petrosa*, in addition to being broad, is also an albino form. Intergrades between broad and slender forms of *ustulata* have been recorded from several localities.



Plate 294. *Mitra (Mitra) ancillides* Broderip. Holotype from Anaa Id., Tuamotu Archipelago (BM (NH) 1967712; 23.8 x 10.6 mm).

Records—GULF OF ADEN: (NMW). PHILIPPINE ISLANDS: Manila (NMW); La Union Point, Lingayen Gulf, Luzon (USNM); Subic Bay, Luzon I. (DMNH); Calapan, Mindoro (AMNH; MCZ). CHINA: Takow (BMNH). RYUKYU ISLANDS: Nase, Amami-Oshima I., S. of Kuyshu (Hitachi, 1969). JAPAN: Mososeki (A. Adams, 1864). PALAU ISLANDS: Koror Island (Cernohorsky coll.). SOLOMON ISLANDS: New Georgia Island (McCollim coll.); Marau Sound, Guadalcanal (Gower coll.). NEW HEBRIDES: Morso; Teuma Bay, Elate I. (both Dale coll.). FIJI ISLANDS: Bay of Islands, Suva Harbour, S. Viti Levu, 8 faths. (Cernohorsky coll.); Kioa I., near Vanua Levu (Garrett, 1880). MARSHALL ISLANDS: Ebon (MCZ). TONGA ISLANDS: Nuku'alofa, Tongatapu I. (Cernohorsky coll.). SOCIETY ISLANDS: Patutua, Tahiti (USNM); Huahine (Garrett, 1880). TUAMOTU ISLANDS: (USNM). HAWAIIAN ISLANDS: Honolulu Harbour, Oahu (ANSP). MIDWAY ISLANDS: (USNM).

Mitra ancillides Broderip, 1836

(Pl. 294)

Range—Anaa Island, Tuamotu Archipelago; Marquesas.

Remarks—Apart from the type-specimen, we have seen only 3 other specimens, all in moderately fresh but beach-worn condition, of this rare species. All the known specimens were collected at Anaa Island, and the exact range of distribution remains unknown. The species is closely related to *M. nivea* Broderip, which it resembles in sculpture and form, but it is appreciably smaller in the adult stage and more slender. *M. ancillides* is the type-species of *Mutyca* H. & A. Adams, by subsequent designation of Wenz (1943); the genus is considered synonymous with *Mitra s. str.*

Habitat—Unknown.

Description—Shell up to 24 mm (about 1 inch) in length, fusiformly-elongate and slender, moderately light in weight. Whorls about 8 apart from a worn protoconch, spire whorls slightly convex, sutures distinct. First 3 post-nuclear whorls fenestrate through bisecting spiral and axial striae of about equal strength, 4th and 5th whorl with spiral threads which are more prominent anteriorly to the sutures, and irregular longitudinal striae. Last 3 whorls with very fine spiral striae only, interstitial grooves occasionally minutely pitted; spiral striae number about 22-23 on the penultimate and about 60 on the body whorl, inclusive of about 10-12 slightly more prominent basal cords. Aperture narrow, about equal in height to the spire, smooth within, outer lip weakly thickened and simple. Columella not calloused, and with 5-7 oblique folds, siphonal canal twisted to the left, siphonal notch distinct. Existing specimens white to fawn in colour, ornamented with faded, yellowish fawn axial zones and bands.

Measurements (mm)—

length	width	height of aperture	
23.8	10.6	11.6	Holotype of <i>ancillides</i> Broderip
21.0	6.4	11.2	Anaa Island, Tuamotus
19.0	—	—	Anaa Island, Tuamotus

Synonymy—

1836 *Mitra ancillides* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Anaa Island); 1845 Reeve, Conchologia Iconica, vol. 2, pl. 38, fig. 319; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 8, fig. 100; 1880 Garrett, Journal of Conchology, vol. 3, p. 11; 1963 J. Cate, Veliger, vol. 6, p. 37, pl. 7, fig. 38 only (copy of Reeve's figure); 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 35, pl. 1, fig. 13 (figured holotype).

1853 *Mitra (Mutya) ancilloides (sic)* Swainson, H. & A. Adams, Genera Recent shells, vol. 1, p. 172.

1882 *Mitroidea ancillides* Swainson, Tryon, Manual of Conchology, vol. 4, p. 162, pl. 47, fig. 374.

1933 *Mitra (Mitroidea) ancillides* Swainson, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 77, p. 154.

1943 *Dibaphus (Mutya) ancilloides (sic)* (Swainson), Wenz, Handbuch der Paläozoologie, vol. 6, p. 1296, fig. 3694.

Types—The holotype of *M. ancillides* is in the British Museum (NH) no. 1967712. Broderip's original dimensions of the type, i.e. length 5 pollex (= 127.0 mm), width 2 pollex (= 50.8 mm) are in complete disagreement with the actual dimensions of the type, and obviously in error. The type locality is Anaa Island, Tuamotu Archipelago.

Nomenclature—J. Cate (1963) considered the

species closely allied to *M. ostergaardi* Pilsbry (= *M. fulvescens* Broderip), and synonymized the "type of *M. golishi* Dall MS" with *M. ancillides*. The specimen figured on pl. 7, fig. 37 in J. Cate as "*golishi*" is not *M. ancillides* but is the slender form of *M. fulvescens* Broderip. The localities of "Hawaiian Islands" and "Marshall Islands" as given by J. Cate, should refer to *M. fulvescens*; the species *M. ancillides* does not live in Hawaii.

Records—TUAMOTU ISLANDS: Anaa Island (IRS; MCZ; BPBM). MARQUESAS: Tahuata (DMNH).

Mitra variabilis Reeve, 1844

(Color pl. 255, figs. 5, 6; pl. 295)

Range—Northern Australia.

Remarks—This species is endemic to Queensland and N.W. Australia. It is variable in sculpture and form, some individuals being broad and spirally grooved, others narrow and slender and prominently corded. The species exhibits transitional characters of *Mitra s. str.* and *Nebularia*.

Habitat—Under stones and coral, from the intertidal zone to a depth of 75 fathoms.

Description—Shell up to 50 mm (2 inches) in length, elongate-ovate to fusiformly-ovate, rather solid. Whorls 7-9 apart from a conical protoconch of 2-3 white, smooth nuclear whorls; sutures mod-

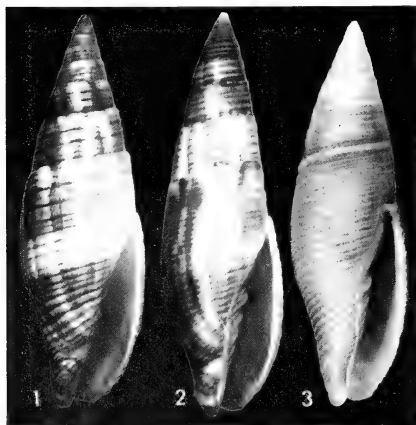


Plate 295. *Mitra (Mitra) variabilis* Reeve.

Fig. 1. Lectotype from Torres Strait, Australia (BM (NH) 1967905; 45.9 x 14.7 mm).

Fig. 2. Lectotype of *M. cylindracea* Reeve; slender, spirally striate form (BM (NH) 1967738; 43.1 x 13.2 mm).

Fig. 3. Lectotype of *M. peasei* Dohrn from Australia; slender, spirally striate form (BM (NH) 1967832; 36.8 x 11.0 mm).

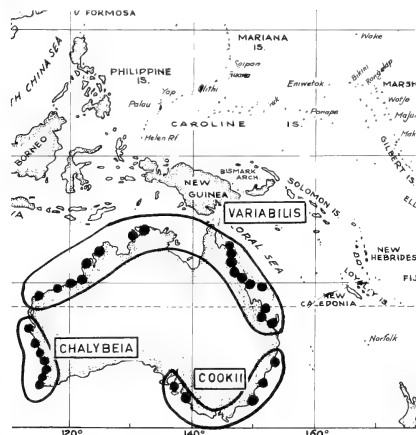


Plate 296. Geographical distribution of the species *Mitra (Mitra) variabilis* Reeve, *M. (M.) chalybeia* Reeve, and *M. (M.) cookii* Sowerby.

erately impressed, spire whorls flat-sided or slightly convex. Postnuclear whorls ornamented with 3 flat or angulate spiral cords which either increase in number or remain stable on later whorls; penultimate whorl with 3-9 spiral cords or grooves, body whorl with 23-36. In some individuals the grooves are very shallow and the intervening cords are almost non-existent; in specimens with deep grooves the resulting cords are elevated and quite prominent and the grooves are also axially striate. Aperture narrow, equal in height or longer than the spire, smooth within; outer lip moderately thickened, regularly convex and finely crenulate in adults. Columella calloused and with 4 or 5 oblique folds, siphonal canal straight, siphonal notch distinct. Brown to tan in colour, ornamented with a broad, pale transverse zone on the body whorl and occasionally with white axial streaks and small spots on all whorls; aperture brown or grey, columella brown, folds paler in colour. The brown periostracum embedded in the spiral grooves gives the appearance of the shell being lined with brown.

Measurements (mm)—

length	width	height of aperture	
45.9	14.7	23.2	Lectotype of <i>variabilis</i>
44.5	14.5	22.6	Bowen, Queensland
43.1	13.2	21.3	Lectotype of <i>cylindracea</i>
36.8	11.0	19.4	Lectotype of <i>peasei</i>
35.6	13.1	19.0	Northwest I., Queensland
31.7	11.0	16.8	Yampi Sound, W. Australia
25.0	10.0	13.3	Feather reef, Queensland

Synonymy—

- 1844 *Mitra variabilis* Reeve, Conchologia Iconica, vol. 2, pl. 13, fig. 95; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 4, pl. 12, figs. 184, 185; 1882 Tryon, Manual of Conchology, vol. 4, p. 119, pl. 35, figs. 47, 56; 1965 Cernohorsky, Veliger, vol. 8, p. 100, pl. 14, fig. 16 (Fiji I.); 1966 Cernohorsky, Veliger, vol. 9, p. 108, fig. 14 (radula); 1971 Wilson & Gillett, Australian Shells, p. 116, pl. 76, figs. 4, 4a.
 1844 *Mitra cylindracea* Reeve, Conchologia Iconica, vol. 2, pl. 13, fig. 97 (no locality given).
 1860 *Mitra peasei* Dohrn, Proc. Zool. Soc. London, p. 366 (Australia).
 1874 *Mitra cylindrica* (sic) Reeve, Sowerby, Thesaurus Conchyliorum, vol. 4, p. 4, pl. 12, fig. 188 (synonymized with *M. variabilis*).
 1920 *Mitra polymorpha* Tomlin, Nautilus, vol. 33, p. 134 (substitute name for *M. variabilis* Reeve, 1844).
 1839 ? *Mitra* (*Tiara*) *yokoyamai* Nomura, Oostingh, Ingen. Nederl.-Indie, vol. 6, p. 8, pl. 10, figs. 175a, b (non Nomura, 1935).
 1959 *Mitra hanleyana* Sowerby, Webb, Handbook Shell Collectors, rev. ed., p. 215, pl. 101, fig. 12 (non Dunker, 1877).
 1970 *Cancilla aegra* Reeve, Cernohorsky, Bull. Auckland Inst. Mus. no. 8, p. 78, pl. 7, fig. 2 (fig. syntype of *M. peasei* Dohrn) [non *M. aegra* Reeve, 1845].

Types—The following types are in the British Museum (NH): the designated lectotype and 2 syntypes of *M. variabilis* Reeve, B. M. (NH) no. 1967905; the selected lectotype and 2 syntypes of *M. cylindracea* Reeve, B. M. (NH) no. 1967738; the selected lectotype and 1 syntype of *M. peasei* Dohrn, B. M. (NH) no. 1967832. The type locality of *M. variabilis* as given by Reeve is Torres Strait, northeastern Australia.

Nomenclature—Tomlin (1920) proposed the superfluous substitute name *M. polymorpha* for *M. variabilis* Reeve, which he presumed to be pre-occupied by *Voluta variabilis* Link, 1807. Originally described in different genera, Link's species is a *Vexillum* s. str. whereas Reeve's species is a *Mitra*. *Mitra cylindracea* Reeve, is the slender, corded form of *M. variabilis* and has been correctly synonymized with this species by Sowerby (1874) and Tryon (1882). *M. peasei* Dohrn, has never been illustrated and consequently has been misinterpreted by most authors. Sowerby's figure of *M. peasei* (1874, pl. 6, fig. 76) from the "Sandwich Islands" (= Hawaii), is the slender form of *Cancilla* (*Domiporta*) *granatina* (Lamarck) and not Dohrn's species. Tryon (1882) copied Sowerby's figures and placed *M. peasei* in the synonymy of *Cancilla isabella* (Swainson). J. Cate's illustrations of *M. peasei* (1962, pl. 34, fig. 1) and (1963, pl. 8, figs. 46, 47) are the slender form of *Cancilla* (*Domiporta*) *granatina* (Lamarck). The illustration of *M. peasei* by the writer (1965, pl. 15, figs. 35, 35a) is the species *Cancilla* (*Domiporta*) *praestantissima* (Röding). The very worn and faded condition of the lectotype of *M. peasei* led to the erroneous association with *Cancilla aegra* (Reeve). Oostingh's (1939) illustration of "*M. yokoyamai*" appears to be the *cylindracea* form of *M. variabilis*, but not Nomura's species, which is a form of *Cancilla isabella* (Swainson).

Records—WEST AUSTRALIA: Broome (USNM; WAM); S.W. of jetty, Broome (Powell coll.); 7 mi. W. of Cape Preston, under limestone rocks, Port Hedland; Yampi Sound; Depuch Island, on shore under rocks; Antoni Mia, Nickol Bay; W. of N.W. Cape, 75 faths. (all WAM). NORTH AUSTRALIA: Clarence Straits, S. of Bathurst I., 28 faths.; Weed Pt., Darwin Harbour (both WAM); Cape Leveque (MCZ). QUEENSLAND: Gloucester Island; Seaforth beach near Mackay; Port Douglas; Brampton reef, Bowen (all USNM); Hope Island (AMNH); Bowen; Garner's beach; Port Curtis (all AIM); Point Cartwright; Goat Island; Moreton Bay; Rosslyn Bay; Keppel Bay; Magnetic Island; Four mile reef, Low Isles; Mossman; Yorkey's Knob, 12 mi. N. of Cairns; Four mile beach, Port Douglas (all Powell coll.); Townsville (Kleckham coll.; Powell coll.); Schoal Point, Mackay (Kleckham coll.); Feather reef, Gt. Barrier reef; N.W. Island, 57 mi. from Keppel Bay (both Eker coll.).

Fossil records (tentative)—PLIOCENE: South Bantam, Java, Indonesia (Oostingh, 1939).

***Mitra chalybeia* Reeve, 1844**

(Color pl. 255, figs. 17, 18; pl. 297)

Range—Albany to Shark Bay, West Australia.**Remarks**—The species is closely related to *M. cookii* and to a lesser extent *M. variabilis*, but it is larger and more solid than *M. cookii* and the spiral sculpture is almost obsolete.**Habitat**—Among sea-weed and under stones, intertidal and sublittoral.**Description**—Shell up to 65 mm (about 2½ inches) in length, fusiformly-ovate, last whorls slightly inflated, only moderately solid. Whorls 9-10 apart from 1½-2 small, light fawn nuclear whorls, spire whorls only slightly convex. Sutures weakly adpressed, irregular and wavy, first post-nuclear whorls sculptured with 3-4 weak spiral cords, later whorls with spiral grooves or weak threads which are minutely axially striate. The spiral sculpture is generally visible only at the anterior area of the sutures; the spiral threads number up to 15 on the penultimate and up to 20 on the body whorl. The base of the shell has about half a dozen spiral cords and longitudinal growth-striae are responsible for the undulating sutures. Aperture equal in height or shorter than the spire, moderately narrow, smooth within; outer lip only slightly thickened and with small, wide-spaced denticles at the margin. Columella calloused anteriorly and only thinly glazed on the parietal wall, and with 3 or 4 moderately solid, oblique plaits; siphonal notch prominent,

siphonal fasciole calloused and twisted. Basic colour generally bluish-grey, ornamented with dark orange-brown or greenish-brown transverse lines and occasionally nebulous, irregular axial streaks; interior or aperture greyish-brown, parietal wall brown, anterior columellar callus pale yellowish orange, interspaces of columellar folds sometimes orange. In some specimens the spiral lines are overlaid with a chocolate-brown colour.

Measurements (mm)—

length	width	height of aperture	
62.0	18.6	27.3	West Australia
51.6	17.9	25.5	Lectotype of <i>chalybeia</i>
41.1	12.4	17.3	West Australia
35.4	12.1	17.1	Syntype of <i>chalybeia</i>
27.0	9.2	13.5	West Australia

Synonymy—1844 *Mitra chalybeia* Reeve, *Conchologia Iconica*, vol. 2, pl. 9, fig. 59 (no locality given); 1882 Tryon, *Manual of Conchology*, vol. 4, p. 116, pl. 34, fig. 30.1874 *Mitra chalybaea* (sic) Reeve, Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 4, pl. 5, fig. 67.1971 *Eumitra chalybeia* Reeve, Wilson & Gillett, *Australian shells*, p. 118, pl. 76, fig. 1.**Types**—The designated lectotype and 2 syntypes of *M. chalybeia* Reeve are in the British Museum (NH) no. 1967709. The species was described from unknown locality, and we designate Beagle Island, West Australia as the type locality (specimen in WAM).**Records**—WEST AUSTRALIA: Cowaramup Bay (AMNH); Bunbury (Clover coll.); Port Gregory; Yanchep reef; Woodmans Point, Cockburn Sound; Beagle Island; Horrocks beach via Northampton; Surf Point, Dirk Hartog's I.; Limestone reef off Sorento Beach; Cottesloe; Greenough beach near Rivermouth; Port Denison (all, WAM); Garden I., Fremantle (MCZ).***Mitra cookii* Sowerby, 1874**

(Pl. 298)

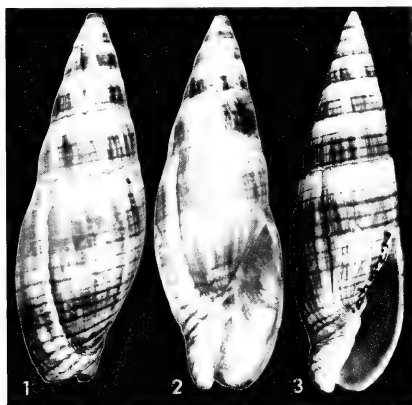
Range—Northern New South Wales to Yorke Peninsula, South Australia.**Remarks**—This species is occasionally reported from southern Queensland, but specimens labelled "*M. cookii*" examined from this area, were the slender form of *M. variabilis* Reeve; the actual occurrence of the species in southern Queensland cannot of course be excluded. Although not previously reported from farther south than New South Wales, we have seen two records from South Australia. The species is intermediate in characters between *M. carbonaria* Swainson and *M. variabilis* Reeve.Plate 297. *Mitra (Mitra) chalybeia* Reeve.Figs. 1, 2. Lectotype of *M. chalybeia* Reeve (BM (NH) 1967709; 51.6 x 17.9 mm).

Fig. 3. Specimen from Beagle Ids., West Australia, in cray-pot (WAM N-2640; 50.0 x 15.4 mm).

Habitat—Under rocks, in the intertidal zone.

Description—Shell up to 40 mm (about 1½ inches) in length, elongate-ovate to fusiformly-ovate, slender and moderately light in weight. Whorls 6-8 apart from 1½-2 nuclear whorls, sutures moderately impressed, spire whorls slightly convex. Moderately smooth in appearance, sculptured with fine, punctate spiral threads which number from 4-10 on the penultimate and up to 40 on the body whorl; the spiral threads are frequently confined to an area near the sutures and the anterior part of the spire whorls and centre of the body whorl are usually smooth. The base of the shell has up to 20 punctate spiral grooves or cords and the body whorl is constricted near the siphonal canal. Aperture slightly shorter or longer than the spire, narrow, smooth within; outer lip moderately thin, simple and regularly convex. Columella only weakly calloused and with 4-5 thin, oblique folds, siphonal notch weak. Dark brown to tan in colour, ornamented with pale axial streaks on the spire whorls and a light coloured central band on the body whorl; the pale transverse zone is occasionally bluish-white and fine axial lines intrude into this zone. The aperture and

columella are brown, the folds are slightly paler.

Measurements (mm)—

length	width	height of aperture	
36.0	12.0	18.0	Woolgoolga, New South Wales
31.6	9.8	14.0	Sydney Harbour, New South Wales
29.0	10.8	15.3	Port Lincoln, S. Australia
28.8	9.4	14.4	Holotype of <i>cookii</i> Sowerby

Synonymy—

- 1871 *Mitra variabilis* Reeve, Angas, Proc. Zool. Soc. London, p. 89 (non Reeve, 1844).
 1874 *Mitra cookii* "Hanley", Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 14, fig. 228 (Australia); 1913 Hedley, Proc. Linn. Soc. New South Wales, vol. 38, p. 314; 1951 Laseron, Rec. Austral. Museum, vol. 22, p. 340, fig. 5.
 1957 *Vicimitra cookii* Sowerby, Cotton, Roy. Soc. Sth. Australia Malac. Section, p. 3; 1959 Allan, Australian shells, rev. ed., p. 182.
 1971 *Eumitra cookii* Sowerby, Wilson & Gillett, Australian shells, p. 118, pl. 76, fig. 5.

Types—In the British Museum (NH) there are 3 so-called "syntypes" of *M. cookii* which bear the numbers B.M. (NH) 1900.2.13.10 and 1907.11.21.128-129. Only the specimen no. 1900.2.13.10 is the holotype ex-Hanley collection and the other two specimens are later additions from the da Costa collection. The type locality is Australia, and this is further restricted to Sydney, New South Wales, Australia.

Records—NEW SOUTH WALES: Point Halliday (Laseron, 1951); Tuncurry (USNM); Woolgoolga (AIM); Sydney Harbour (Clover coll.). SOUTH AUSTRALIA: Port Lincoln (Cernohorsky coll.); Brentwood, Yorke Peninsula (WAM).

Mitra carbonaria Swainson, 1822

(Color pl. 255, figs. 21, 22; pl. 299)

Range—West Australia to S.E. Australia, New Zealand and the Kermadec Islands.

Remarks—This common, temperate water Austral-Neozelanic species is very variable in size, shape, sculpture and colour, and consequently has received a host of specific names. The occurrence of numerous intergrades between the various forms, currently recognized as "species", forces us to consider them as sympatric forms and ecophenotypic variants rather than allopatric subspecies or valid species. The various forms of *M. carbonaria* are briefly discussed:

rhodia form: a slender, very small and often immature form, which occurs throughout the dis-

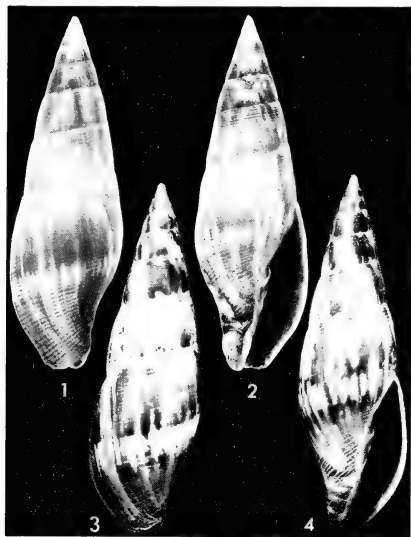


Plate 298. *Mitra (Mitra) cookii* Sowerby.

Figs. 1, 2. Holotype from Australia (BM (NH) 1900.2.13.10; 28.8 x 9.4 mm).

Figs. 3, 4. Specimen from Sydney Harbour, Australia (Clover coll.; 31.6 x 9.8 mm).

tributional range of the species and is more frequently collected sublittorally; this form is also moderately common in New Zealand, at depth from 10 to 17 fathoms.

badia form: this is the short, broad and smaller form of *M. carbonaria* which is more frequently encountered from Victoria to West Australia. The species subsequently described as *M. castanea* A. Adams, and *M. rosettae* Angas, represent the broad form. Sowerby (1874), Hedley (1913) and Cotton (1957) synonymized *M. badia* with *M. carbonaria*, but Hedley (*loc. cit.*) specifically separated *M. rosettae* on the basis of the variable

sculptural features of more wide-spaced spiral grooves.

perksi form: This is the *albino* form of the southern population of *M. carbonaria* and although somewhat more slender than typical *badia*, it is intermediate in width ratio between *badia* and *carbonaria*. This form has been recorded as a white variety of *M. badia* by Pritchard & Gatliff (1899) and Macpherson & Gabriel (1962) from Port Fairy, Victoria. We have seen further specimens from Port McDonnell and Middleton, South Australia. The form is white, inside and out, when the brown periostracum is removed, but in

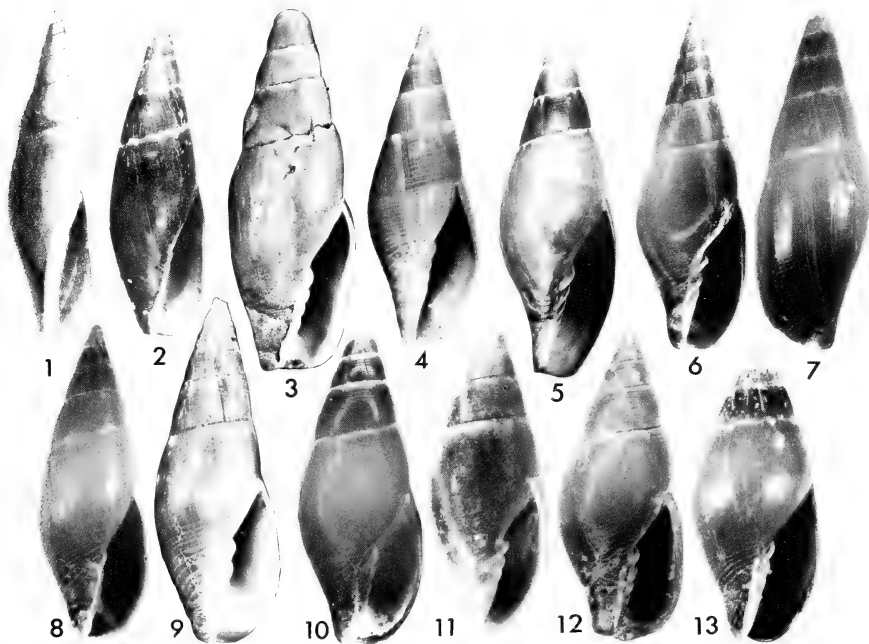


Plate 299. *Mitra (Mitra) carbonaria* Swainson.

- Fig. 1. Lectotype figure of *M. carbonaria* Swainson from New South Wales, Australia (from Swainson, 1829, pl. 5, centre figure; c. 68.5 mm).
 Fig. 2. Holotype of *Vicimitra contermina* Iredale from Sydney Harbour, Australia (AMS C-60677; 69.4 x 21.0 mm). [photo courtesy of P. Colman, AMS].
 Fig. 3. Holotype of *M. maoria* Finlay from Tauranga beach, New Zealand (AIM TM-481; 47.8 x 16.5 mm).
 Fig. 4. Holotype of *M. sinusigera* Laseron from Longreef, Collaroy, Australia; juvenile (AMS C-65643; 17.3 x 5.9 mm) [photo courtesy of P. Colman, AMS].
 Fig. 5. Holotype of *M. digna* A. Adams from Australia; immature specimen (BM (NH) 1958.8.30.3; 46.0 x 15.1 mm).
 Fig. 6. Lectotype of *M. rhodia* Reeve (BM (NH) 1967857; 24.9 x 8.4 mm).

- Fig. 7. Specimen from Poor Knights Ids., New Zealand; small *rhodia* form (AIM; 21.2 x 7.3 mm).
 Fig. 8. Specimen from Vaucluse, New South Wales, Australia; small *rhodia* form (WABP coll.; 19.6 x 6.8 mm).
 Fig. 9. Specimen from Port McDonnell, South Australia; albino form with periostracum (WOC coll.; 23.2 x 8.5 mm).
 Fig. 10. Holotype of *M. badia* Reeve (BM (NH) 1966713; 29.0 x 11.2 mm).
 Fig. 11. Lectotype of *M. rosettae* Angas from Rosetta Head, Encounter Bay, South Australia (BM (NH) 1870.10.26.95; 20.3 x 8.2 mm).
 Fig. 12. Holotype of *M. castanea* A. Adams (BM (NH) 1967723; 20.0 x 8.2 mm).
 Fig. 13. Specimen from Bunker Bay, West Australia (WAM 157.70; 18.9 x 8.2 mm).

some intermediate specimens the sutural half of the body whorl has a broad brown band.

Habitat—In coral sand, shell-debris and mud, under rocks, from the intertidal zone to a depth of 21 fathoms.

Description—Shell up to 70 mm (about 3 inches) in length, fusiformly-elongate to elongate-ovate, moderately solid. Whorls 6-8 apart from protoconch of 2-3 glassy-fawn, depressed nuclear whorls; spire whorls slightly or distinctly convex, sutures distinct but tight, irregular and occasionally weakly jagged. Spiral sculpture consists of shallow and usually minutely punctate spiral grooves and numerous, tightly packed, macroscopic longitudinal striae; spiral striae number up to 25 on the penultimate and up to 30 on the body whorl, striae usually obsolete in the centre of the body whorl, some individuals with the last 3-4 whorls almost smooth. Aperture slightly shorter or longer than the spire, moderately narrow and smooth within; outer lip only moderately thickened and simple. Lower half of columella weakly calloused and with 4-5 oblique folds, siphonal fasciole straight, siphonal notch distinct. Dark tan to blackish-brown in colour, sutures occasionally finely spotted or narrowly lined with white, especially in young specimens; some individuals, particularly of the southern form *badia*, may have a few brown spiral lines. Interior of aperture brown or greyish-brown, parietal wall brown, columellar folds cream, fawn or occasionally flushed with light orange-brown; albino specimens are uniformly white under a yellowish-brown periostracum, but some intermediate specimens have a broad, light brown band on the sutural half of the body whorl.

Measurements (mm)—

length	width	height of aperture	
69.4	21.0	32.5	Holotype of <i>contermina</i>
68.5	—	—	Type of <i>carbonaria</i> (from figure)
64.0	20.0	32.4	Long reef, N.S.W.
50.5	17.8	25.6	Port Jackson, N.S.W.
47.8+	16.5	24.0	Holotype of <i>maoria</i>
46.0	15.1	24.0	Holotype of <i>digna</i> (juvenile)
45.2	15.0	22.5	High Island, New Zealand
35.0	12.2	16.7	Port McDonnell, South Australia
29.0	11.2	14.6	Holotype of <i>badia</i>
24.9	8.4	12.0	Lectotype of <i>rhodia</i>
24.8	10.5	13.7	Rottneft I., W. Australia
22.0	8.0	12.0	Poor Knights I., New Zealand

21.5	8.0	—	Holotype of <i>perksi</i>
20.3	8.2	10.7	Lectotype of <i>rosettae</i>
20.0	8.2	9.4	Holotype of <i>castanea</i>
18.5	6.5	9.0	Port Jackson, N.S.W.
17.3	5.9	8.9	Holotype of <i>sinusigera</i> (juvenile)

Synonymy (for *carbonaria* form)—

- 1822 *Mitra carbonaria* Swainson, Cat. coll. Bligh, App. p. 10 (New South Wales; New Holland); 1834, Exotic Conchology, p. 37; 1908 Hedley, Proc. Linn. Soc. New South Wales, vol. 33, p. 461; 1913, Proc. Linn. Soc. New South Wales, vol. 38, p. 312; 1913 Suter, Manual New Zealand Mollusca, p. 361, pl. 46, fig. 10 (New Zealand); 1915 Iredale, Trans. New Zealand Institute, vol. 47, p. 464 (Kermadec I.); 1924 Bucknill, Seashells of New Zealand, p. 61, pl. 3, fig. 10; 1932 Cotton & Godfrey, South Australian Naturalist, vol. 13, p. 76; 1970 Cernohorsky, Nautilus, vol. 83, p. 100; 1970, Bull. Auckland Inst. Museum, no. 8, p. 12, fig. 42 (radula from Australian specimen), fig. 43 (radula from New Zealand specimen).
- 1829 *Mitra melaniana* Lamarck, Swainson, Zoological Illustrations, ser. 2, vol. 1, pl. 5, centre figures (figured type of *M. carbonaria* Swainson); 1882 Tryon, Manual Conchology, vol. 4, p. 127, pl. 37, figs. 118, 119; 1899 Pritchard & Gatliff, Proc. Roy. Soc. Victoria, vol. 11, p. 186 (non *M. melaniana* Lamarck, 1811).
- 1844 *Mitra nigra* Reeve, Conchologia Iconica, pl. 5, fig. 33; 1867 Angas, Proc. Zool. Soc. London, p. 193; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 6, pl. 1, fig. 4; 1966 Cernohorsky, Veliger, vol. 9, p. 108, fig. 12a (radula), fig. 12b (penis); 1967, Marine shells Pacific, p. 143, pl. 32, fig. 206 (non *Voluta nigra* Gmelin, 1791).
- 1845 *Mitra rhodia* Reeve, Conchologia Iconica, vol. 2, pl. 28, fig. 225 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 6, pl. 13, fig. 213 and pl. 16, fig. 302; 1882 Tryon, Manual of Conchology, vol. 4, p. 127, pl. 37, fig. 114; 1889 Brazier, Journal of Conchology, vol. 6, p. 67; 1913 Hedley, Proc. Linn. Soc. New South Wales, vol. 38, p. 313; 1917, Proc. Linn. Soc. New South Wales, vol. 41, pl. 48, fig. 15 (animal), fig. 16 (radula); 1923 May, Illust. Index Tasmanian shells, p. 79, pl. 37, fig. 13; 1932 Cotton & Godfrey, South Australian Naturalist, vol. 13, p. 76; 1951 Laceron, Rec. Austral. Museum, vol. 22, p. 338, fig. 1 (shell), fig. 1a (protoconch).
- 1855 *Volutomitra digna* A. Adams, Proc. Zool. Soc. London, p. 135 (Australia); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 6, pl. 10, fig. 145.
- 1886 *Mitra (Nebularia) rhodia* Reeve, Watson, Rept. voy. H.M.S. Challenger, Zoology, vol. 15, p. 246.
- 1927 *Mitra muoria* Finlay, Trans. New Zealand Institute, vol. 57, p. 409, pl. 19, fig. 57 (Tauranga beach, New Zealand).



Plate 300. Geographical distribution of *Mitra (Mitra) carbonaria* Swainson.

- 1936 *Vicimitra contermina* Iredale, Rec. Austral. Museum, vol. 19, p. 320, pl. 23, fig. 15 (Sydney Harbour, N.S.W., Australia) [non *Mitra contermina* Bellardi, 1887].
- 1951 *Mitra (Vicimitra) contermina* Iredale, Laseron, Rec. Austral. Museum, vol. 22, p. 338, fig. 8 (protoconch).
- 1951 *Mitra sinuigera* Laseron, Rec. Austral. Museum, vol. 22, figs. 2, 2a (Longreef, Collaroy, N.S.W., Australia) [juvenile specimen].
- 1962 *Eumitra melaniana* (Lamarck), Macpherson & Gabriel, Marine Molluscs Victoria, p. 214, fig. 255.
- 1968 *Mitra (Eumitra) maoria* Finlay, Ponder, Rec. Dominion Museum, vol. 6, p. 45, figs. 28, 29 (radula), figs. 53, 54 (shell).
- 1971 *Eumitra nigra* Gmelin, Wilson & Gillett, Australian Shells, p. 118, pl. 76, fig. 4. (non *Voluta nigra* Gmelin, 1791).

Synonymy (for *badia* form)—

- 1844 *Mitra badia* Reeve, Conchologia Iconica, vol. 2, pl. 20, fig. 157 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 12, fig. 181; 1899 Pritchard & Gatliff, Proc. Roy. Soc. Victoria, vol. 11, p. 187; 1901 Tate & May, Proc. Linn. Soc. New South Wales, p. 360; 1936 Gabriel, Victorian Sea shells, p. 15, textfig.; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 12, fig. 40 (radula).
- 1853 *Mitra castanea* A. Adams, Proc. Zool. Soc. London, p. 140 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 13, fig. 205; 1882 Tryon, Manual of Conchology, vol. 4, p. 127, pl. 37, fig. 115 (non *M. castanea* Röding, 1798).
- 1865 *Mitra rosettae* Angas, Proc. Zool. Soc. London, p. 55, pl. 2, fig. 6 (Rosetta Head, Encounter Bay, Sth. Australia); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 17, fig. 339; 1882 Tryon, Manual of Conchology, vol. 4, p. 121, pl. 35, fig. 64; 1899 Pritchard & Gatliff, Proc. Roy. Soc. Victoria, vol. 11, p. 187; 1932 Cotton & Godfrey, South Australian Naturalist, vol. 13, p. 77, pl. 4, fig. 6.
- 1882 *Mitra testacea* (pars) Tryon, Manual of Conchology, vol. 4, p. 127, pl. 37, fig. 112 (non Broderip, 1836).
- 1908 *Mitra badia* var. *rosettae* Angas, Verco, Cat. Mar. Moll. South Australia, p. 13.
- 1908 *Mitra perksi* Verco, *ibid.*, p. 13 (*nomen nudum*).
- 1932 *Mitra perksi* "Verco, Cotton & Godfrey, South Australian Naturalist, vol. 13, p. 77 (Encounter Bay, Sth. Australia).
- 1957 *Vicimitra perksi* Verco, Cotton, Roy. Soc. South Australia, Malac. Section, no. 12, fig. 4 (re-description).
- 1957 *Vicimitra rosettae* Angas, Cotton, *ibid.*, p. 3, fig. 3.
- 1962 *Eumitra badia* (Reeve), Macpherson & Gabriel, Mar. Shells Victoria, p. 213, fig. 255; 1971 Wilson & Gillett, Australian Shells, p. 118, pl. 76, fig. 3.
- 1962 *Eumitra perksi* (Verco), Gabriel, Mem. Nat. Mus. Melbourne, no. 25, p. 191.

Types—The type of *M. carbonaria* Swainson, cannot be found in the Manchester Museum where it has been originally deposited, and was subsequently figured by Swainson under the name *M. melaniana*. The following types are in the British Museum (NH): the holotype of *M. badia* Reeve, B. M. (NH) no. 1966713; the designated lectotype and 1 syntype of *M. rhodia* Reeve, B. M. (NH) no. 1967857; the holotype of *M. castanea* A. Adams, B. M. (NH) no. 1967723; the holotype of *M. digna* A. Adams, B. M. (NH) no. 1958.8.30.3 (a juvenile specimen); and the designated lectotype and 2 syntypes of *M. rosettae* Angas, B. M. (NH) no. 1870.10.26.95. The holotype of *M. contermina* (Iredale), no. C.60677 and the holotype of *M. sinuigera* Laseron, no. C.65643 (a

juvenile specimen) are in the Australian Museum, Sydney. The holotype of *M. perksi* Cotton & Godfrey, no. D.13507 is in the South Australian Museum, Adelaide, and the holotype of *M. maoria* Finlay, no. TM-481, is in the Auckland Institute & Museum, Auckland. The original type locality is New South Wales, New Holland, which is further restricted to Sydney, New South Wales, Australia.

Nomenclature—The taxa *M. nigra* (Gmelin, 1791) and *M. melaniana* Lamarck, 1811, are not applicable to the Australasian species, but represent the superficially similar West African species erroneously known in literature as "*M. fusca*" (not of Swainson) Lamarck's type of *melaniana* is unfortunately lost but his figure citations make the taxon an objective synonym of the West African *M. nigra* (Gmelin). Swainson originally described his species as *M. carbonaria*, but later (see synonymy) erroneously placed the species in the synonymy of *M. melaniana* Lamarck. Iredale (1936) considered *M. carbonaria* to be conspecific with *M. glabra* Swainson, and proposed *Vicimitra contermina* for the New South Wales *M. carbonaria*. Iredale's taxon is a secondary homonym of *M. contermina* Bellardi, 1887. The authorship of the albino form *M. perksi* is usually credited to Verco, whose original citation is a nude name, but has been validated by Cotton & Godfrey (1932).

Records—AUSTRALIA: NEW SOUTH WALES: Longreef, Collaroy; Redhead, Bendalong (both Cernohorsky coll.); Port



Plate 301. *Mitra (Mitra) multisulcata* Harris. Muddy Creek, Victoria, Miocene of Australia. Fig. 1. Lectotype (BM (NH) G-9361; 2 x 7.4 mm). Fig. 2. Syntype (BM (NH) G-9361; 19.0 mm).

Jackson (USNM; AIM); Sydney (WAM; Clover coll.); Port Stephens; Newport (both AIM); Cronulla (Clover coll.); Vauluse, Sydney; Kurnell, Botany Bay; Boat Harbour; Long Bay; North Harbour; Shellharbour (all Powell coll.); VICTORIA: Port Fairy (AIM); Flinders (Cernohorsky coll.); Point Roadknight; Phillip Island; Western Port (all Pritchard & Gatliff, 1899); Frankston; Sorrento; Nepean; Queenscliff (all Gabriel, 1936). SOUTH AUSTRALIA: Port McDonnell (Cernohorsky coll.); Middleton (Powell coll.); Brentwood; Yorke Peninsula (WAM); TASMANIA: Tamar Heads (BMNH); Kelso (AIM); Port Arthur (AIM); Kings Island, Bass Strait (USNM). WEST AUSTRALIA: Caveening Bay, Garden I.; off Dunsborough, 8 faths.; Zeewyck Channel, Abrolhos I., 21 faths.; Cabbage beach, Cape Naturaliste; Bunbury; Eagle Bay beach, Cape Naturaliste; Bunker Bay; W. end of Rottnest Island; Cape Vlaming, Rottnest I. (all WAM). NEW ZEALAND: Maungaroa and Maraetai Bay, near Te Kaha; Waihou Bay, Cape Runaway; Motunui Rock, Onaio Bay (all Marshall coll.); The Cave, Poor Knights Islands, 17 faths.; High I., Whangarei Heads; Takau Bay; Tauranga; Cape Maria van Diemen; Mt. Maunganui, Tauranga (all AIM); Taupo Bay, Whangaroa; Hawera beach; Mokohinau Island; Little Omaha, Hauraki Gulf; Leigh, Hauraki Gulf; Robinson Island, Bay of Islands; Ngunguru, N. of Whangarei (all Powell coll.); Reotahi, Whangarei Heads (Gardner coll.); Bland Bay, Whangaruru (Hipkins coll.). KERMADEC ISLANDS: (Iredale, 1915).

***Mitra multisulcata* Harris, 1897**

(Pl. 301)

Range—Miocene of Victoria, Australia.

Remarks—The species resembles the small *rhodia* form of *M. carbonaria* Swainson, and has the same, fine and predominantly spiral sculpture. The species is fusiformly-elongate, with a short aperture and a sculpture of numerous, finely pitted spiral grooves and longitudinal hair-lines. In the largest syntype the pittings are less prominent and the grooves are slightly deeper and produce narrow spiral striae. Harris gave dimensions for the largest of his syntypes, but illustrated another, less mature specimen. The syntype series in the Department of Palaeontology, British Museum (NH), no. G-9361, consists of 5 specimens, ranging from immature to juvenile, and the largest specimen, length 24.0 mm, with 7.4 mm, which has c. 40 spiral threads on the body whorl and 15 on the penultimate whorl and 5 columellar folds, is here selected as the lectotype of *M. multisulcata*.

Synonymy—

1897 *Mitra multisulcata* Harris, Cat. Tert. Moll. British Museum, p. 120, pl. 5, figs. 1a-d (Muddy Creek, Victoria, Australia; Miocene).

***Mitra glabra* Swainson, 1821**

(Color pl. 255, figs. 19, 20; pl. 302)

Range—New South Wales to Tasmania and Western Australia.

Remarks—The species superficially resembles *M. chalybeia* Reeve, but differs in colouring and the appreciably shorter aperture. The form *de-*

clivis Reeve, which is more frequently encountered in South Australia, is shorter and more compact, the grooves are deeper and give rise to flat spiral cords.

Habitat—In sand pools and on a coral reef substratum, from the intertidal zone to a depth of 30 fathoms.

Description—Shell up to 100 mm (4 inches) in length, fusiformly-elongate but occasionally fusiformly-ovate, moderately solid. Whorls 9-10

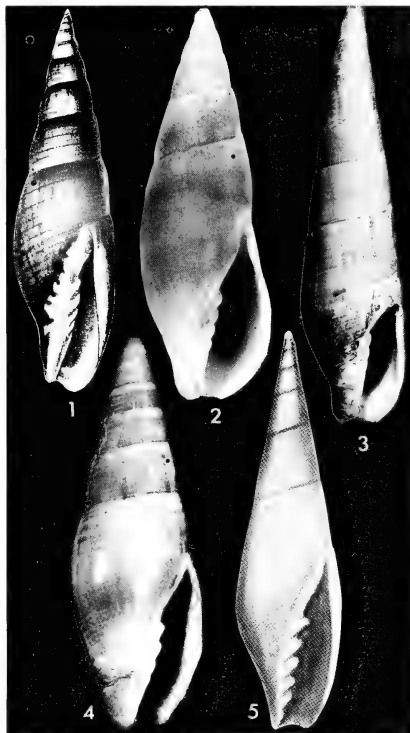


Plate 302. *Mitra (Mitra) glabra* Swainson (figs. 1-4) and *M. coxi* (Ludbrook) (fig. 5).

Fig. 1. Lectotype figure of *M. glabra* Swainson (from Swainson, 1821, pl. 2).

Fig. 2. Holotype of *M. bulimoides* Reeve; very worn specimen (BM (NH) 1966656; 33.2 x 10.9 mm).

Fig. 3. Holotype of *Vicimitra exposita* Iredale from Sydney, Australia; slender form with short aperture (AMS C-60676; 72.5 x 18.2 mm) [photo courtesy P. Colman, AMS].

Fig. 4. Specimen from Port Lincoln, South Australia; short, broad form *declivis* Reeve (WOC coll.; 45.0 x 15.0 mm).

Fig. 5. Holotype of *Mitra (Mitra) coxi* (Ludbrook) from Muddy Creek, upper beds, Victoria, Pliocene of Australia (from Ludbrook, 1958, pl. 6, fig. 4; 61.5 x 17.0 mm).

apart from protoconch, spire whorls almost flat-sided or very slightly convex, sutures occasionally irregular, particularly on the body whorl. Sculptured with minutely pitted or macroscopically striate, shallow spiral grooves which usually become obsolete on the centre of the body whorl; spiral grooves number up to 15 on the penultimate and up to 25 on the body whorl, base of shell with 6-10 oblique cords. Some of the spiral grooves are orange-brown and appear as wide-spaced grooves; in some individuals the post-nuclear whorls develop rather deep grooves which give rise to flat spiral cords which may persist to the sutural area of the body whorl. In some specimens, macroscopically fine longitudinal striae are visible. Aperture variable in length but usually short, 37-45% of total shell-length, narrow or moderately open, smooth within; outer lip slightly thickened and simple, and occasionally prominently convex. Parietal wall glazed, columella calloused anteriorly and with 4 or 5 prominent, oblique folds; siphonal fasciole short and usually with a calloused twist, siphonal notch distinct. Flesh, fawn, tan or light orange-brown in colour, usually ornamented with nebulous, narrow, dark brown axial streaks, and wide-spaced, dark orange-brown spiral lines; the aperture and columella are either light orange-brown or the margin of the aperture is orange-brown, the interior is pale greyish-white and the columellar folds are whitish.

Measurements (mm)—

length	width	height of aperture	
87.0	21.4	33.6	Outer Harbour, South Australia
75.0	21.8	31.5	Port Maquarie, N.S.W.
72.5	18.2	24.1	Holotype of <i>exposita</i>
60.5	17.4	26.0	Port Maquarie, N.S.W.
42.8	14.2	19.3	Port Lincoln, South Australia
37.4	13.6	16.4	St. Vincent's Gulf, South Australia
33.2	10.9	14.7	Holotype of <i>bulimoides</i>

Synonymy—

- 1821 *Mitra glabra* Swainson, Exotic Conchology, pt. 3, pl. 2, top and bottom figs. (no locality given); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 6, fig. 43; 1865 Angas, Proc. Zool. Soc. London, p. 165 (St. Vincent's Gulf and Guichen Bay); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 4, fig. 54; 1882 Tryon, Manual of Conchology, vol. 4, p. 117, pl. 34, fig. 42; 1899 Pritchard & Gatliff, Proc. Roy. Soc. Victoria, vol. 11, p. 186; 1923 May & Tate, Index Tasmanian shells, p. 79, pl. 37, fig. 6; 1932 Cotton & Godfrey, South Australian Naturalist, vol. 13, p. 76, pl. 4, fig. 1; 1941 Ludbrook, Trans. Roy. Soc. Sth. Australia, vol. 65, p. 100 (Pliocene of Sth. Australia); 1966 Cernohorsky, Veliger, vol. 9, p. 108, fig. 13 (radula); 1970, Bull. Auckland Inst. Museum, no. 8, p. 66, pl. 1, fig. 9 (figured holotype of *M. bulimoides* Reeve).

- 1833 *Mitra buccinata* Quoy & Gaimard, Voyage Astrolabe, Zoology, vol. 2, p. 653, pl. 45 bis, figs. 14, 15 (New Holland); 1838 Kiener, Spécies générale iconographie coquilles vivantes, vol. 3, p. 32, pl. 11, fig. 31.
1844 *Mitra declivis* Reeve, Conchologia Iconica, vol. 2, pl. 6, fig. 44 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 14, fig. 233 and pl. 15, fig. 272; 1882 Tryon, Manual of Conchology, vol. 4, p. 118, pl. 34, figs. 39, 41.
1844 *Mitra bulimoides* Reeve, Conchologia Iconica, vol. 2, pl. 28, fig. 224 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 6, pl. 12, fig. 180.
1882 *Mitra testacea* (pars) Tryon, Manual of Conchology, vol. 4, p. 127, pl. 37, fig. 111 (non Broderip, 1836).
1936 *Vicimitra exposita* Iredale, Rec. Austral. Museum, vol. 19, p. 320, pl. 23, fig. 16 (Sydney, N.S.W., Australia).
1951 *Mitra (Vicimitra) exposita* Iredale, Laseyron, Rec. Austral. Museum, vol. 22, fig. 7 (protoconch).
1957 *Vicimitra glabra* Swainson, Cotton, Roy. Soc. South Australia, Malac. Section, p. 3, fig. 2.
1962 *Eumitra glabra* (Swainson), Macpherson & Gabriel, Mar. molluscs Victoria, p. 212, fig. 253; 1971 Wilson & Gillett, Australian Shells, p. 118, pl. 76, fig. 2.

Types—The types of *M. glabra* Swainson and *M. declivis* Reeve, have been sold at auction of the Bligh and Norris collections. Swainson's two unnumbered figures on plate 2 of "Exotic Conchology" are designated as the lectotype of *M. glabra*. The holotype of *M. bulimoides* Reeve is in the British Museum (NH) no. 1966656; it is a small, faded and very worn individual of *M. glabra*. The type of *M. buccinata* Quoy & Gaimard, is in the Museum National d'Histoire Naturelle, Paris, and the holotype of *M. exposita* (Iredale) is in the Australian Museum, Sydney, no. C.60676. No locality was given by Swainson, and Quoy & Gaimard's first correct locality indication of "New Holland" is further restricted to Sydney, New South Wales, Australia.

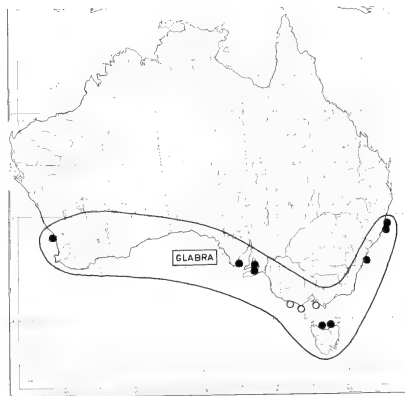


Plate 303. Geographical distribution of *Mitra (Mitra) glabra* Swainson.

Records—AUSTRALIA: NEW SOUTH WALES: Sydney Harbour; Botany Bay (both USNM); Newport (AIM); Long-reef, Collaroy (Powell coll.); Port Macquarie; Redhead, Benda-long (both Cernohorsky coll.); VICTORIA: Western Port, Orway coast; Port Fairy (all Pritchard & Gatliff, 1899). SOUTH AUSTRALIA: Semaphore; Gulf of St. Vincent (MCZ); Outer Harbour, Adelaide (all AIM); Port Lincoln (Cernohorsky coll.). TASMANIA: Kelson (AIM); Ulverstone (AMNH). WEST AUSTRALIA: Cottesloe reef; Fremantle (WAM).

Fossil records—(tentative): Abbatoirs Bore, Adelaide, Sth. Australia; Pliocene (Ludbrook, 1941).

***Mitra coxi* (Ludbrook, 1958)**

(Pl. 302, fig. 5)

Range—Pliocene of Victoria and South Australia.

Remarks—The species is related to *M. glabra* Swainson. The original description is as follows:

"A fairly large *Eumitra*, rather broad, with a comparatively short aperture. Protoconch small and rather flattened, of one-and-a-half smooth turns. Adult whorls six, smooth but for growth striae; body whorl large, gently convex and sub-angulate at the shoulder; base constricted with faint converging growth lines. Suture impressed. Aperture rectangularly elongate, angulate posteriorly; outer lip and columella nearly parallel over most of their length; outer lip nearly vertical in profile; columella slightly oblique, with five plaits".

Measurements (mm)—

length	width	height of aperture	
61.5	17.0	25.0	Holotype of <i>coxi</i> Ludbrook

Synonymy—

1958 *Mitraria* (*Eumitra*) *coxi* Ludbrook, Trans. Roy. Soc. South Australia, vol. 81, p. 71, pl. 6, fig. 4 (McDonald's Bank, Muddy Creek, upper beds, Victoria, Pliocene; holotype in Department of Palaeontology, British Museum (NH) no. G-39670).

***Mitra picta* Reeve, 1844**

(Pl. 304)

Range—North of Bashee River mouth to the Cape of Good Hope, South Africa.

Remarks—Although moderately common in beach-worn condition, live-taken specimens are rare. *M. picta* is similar to *M. latruncularia* Reeve, and immature specimens are difficult to separate. Adult specimens of *M. picta*, however, differ in having a more slender shell, larger spire, short aperture and finely punctate, shallow spiral grooves instead of the more prominent cords in *M. latruncularia*.



Plate 304. *Mitra* (*Mitra*) *picta* Reeve.

Fig. 1. Holotype of *M. tessellata* Kiener; juvenile (MHNG 1108/1; 24.1 x 8.9 mm).

Fig. 2. Lectotype of *M. picta* Reeve (BM (NH) 1967839; 31.7 x 9.8 mm).

Figs. 3, 4. Specimen from Jeffrey's Bay, South Africa (WOC coll.; 29.6 x 9.6 mm).

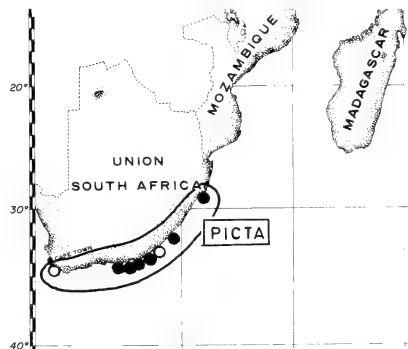


Plate 305. Geographical distribution of *Mitra* (*Mitra*) *picta* Reeve.

Habitat—Unknown.

Description—Shell up to 40 mm (about 1½ inches) in length, fusiformly-elongate and only moderately solid, sutures distinct, irregular and wavy. Whorls 5-6 apart from protoconch of 1½-2 usually worn nuclear whorls, spire whorls convex and slightly waisted at the body whorl suture. Sculptured with shallow spiral grooves which are

rendered minutely punctate by very fine, overriding longitudinal striae; spiral grooves number up to 12 on the penultimate and up to 19 on the body whorl, lower third of last whorl with about a dozen weak and oblique cords. Aperture shorter than the spire in adult specimens, narrow and smooth within; outer lip weakly thickened and simple. Columella only weakly calloused anteriorly and with generally 4, rarely 3 or 5, oblique folds, siphonal fasciole short, siphonal notch not very prominent. Dark reddish-brown in colour, ornamented with irregular, white axial flames and blotches, body whorl with a nebulous and interrupted white central band; interior of aperture and parietal wall brown, folds and adjoining area greyish-white.

Measurements (mm)—

length	width	height of aperture	
42.5	11.3	19.0	Jeffreys Bay
40.0	11.2	16.8	Jeffreys Bay
31.7	9.8	15.4	Lectotype of <i>picta</i>
29.6	9.6	14.4	Jeffreys Bay
24.1	8.9	13.0	Holotype of <i>tessellata</i>

Synonymy—

- 1838 *Mitra tessellata* Kiener, *Spécies général iconographie coquilles vivantes*, vol. 3, p. 37, pl. 13, fig. 42 (no locality given) [non Lamarck, 1811; nec Swainson, 1824].
 1844 *Mitra picta* Reeve, *Conchologia Iconica*, vol. 2, pl. 16, fig. 123 (no locality given); 1848 Krauss, *Südafrikanische Mollusken*, p. 124; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 5, pl. 14, figs. 242, 243; 1932 Turton, *Marine Shells Port Alfred*, p. 46, pl. 10, fig. 344 (juvenile); 1959 Barnard, *Ann. South African Museum*, vol. 45, p. 41.
 1882 *Mitra barbadensis* Tryon (pars), *Manual of Conchology*, vol. 4, p. 118, pl. 35, fig. 48 (*M. tessellata* Kiener), fig. 49 (*M. picta* Reeve) [non *Voluta barbadensis* Gmelin, 1791].
 1904 *Mitra (Isara) schroeteri* Chemnitz, von Martens, *Wiss. Ergeb. Deut. Tiefsee-Exp. "Valdivia"*, vol. 7, p. 53, (non *Voluta schroeteri* Link, 1807).

Types—The designated lectotype and 2 syntypes of *M. picta* Reeve, are in the British Museum (NH) no. 1967839. The juvenile holotype of *M. tessellata* Kiener, is in the Museum d'Histoire Naturelle, Geneva, no. 1108/1. *M. picta* was described from unknown locality and was first localized by Krauss (1848) from the "Cape coast" and later by Sowerby (1874) from the Cape of Good Hope, which is here designated as the type locality.

Nomenclature—When Kiener (1838) described *M. tessellata*, he cited as reference figures 1733 and 1734 from Chemnitz, vol. 11, 1795; the illustrated specimen is the species *Voluta schroeteri* Link, 1807, a West African form of *M. cornicula* (Linnaeus); Kiener's type of *tessellata*, however, is the species *M. picta*. Martens arrived at the

conclusion that the South African *M. picta* is conspecific with the West African *M. schroeteri*, and Tryon (1882) considered *picta* the same as the Caribbean *M. barbadensis* (Gmelin, 1791). The South African *M. picta*, although superficially similar to both species, is nevertheless a distinct species.

Records—SOUTH AFRICA: Port Alfred (USNM; AMNH); Jeffreys Bay near Humansdorp coast; N. of Bashee River mouth, 32°S & 29°E; Xora, Transkei coast (all USNM); Jeffreys Bay (USNM; DMNH; Powell coll.); Port Elizabeth (Clover coll.); Algoa Bay (Powell coll.); False Bay; East London (both von Martens, 1904).

Mitra latruncularia Reeve, 1844

(Pl. 306)

Range—North of Bashee River mouth to the Cape of Good Hope, South Africa.

Remarks—The distributional range of the similar species *M. picta* and *M. latruncularia* is identical according to available material. Adult specimens of *M. latruncularia* can be distinguished from *M. picta* on the basis of distinct spiral cords and longer aperture. Garrett (1880) reported the species from the Fiji Islands, but the specimens so recorded appear to be *M. fulgetrum* (Reeve).

Habitat—Unknown.

Description—Shell up to 30 mm (about 1¼ inches) in length, more solid and less fusiform than *M. picta*, elongate-ovate, sutures irregular. Whorls 5-5½, apart from protoconch of about 1½ worn whorls, spire whorls slightly convex, sutures irregular and sometimes wavy. Sculptured with

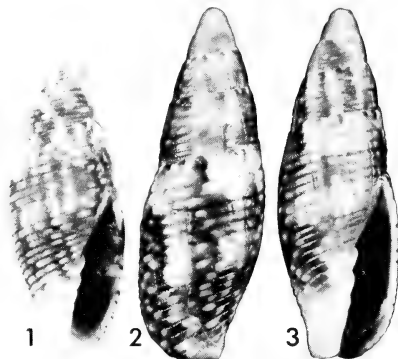


Plate 306. *Mitra (Mitra) latruncularia* Reeve.

Fig. 1. Lectotype of *M. latruncularia* Reeve (BM (NH) 1967793; 25.0 x 8.6 mm).

Figs. 2, 3. Specimen from Jeffrey's Bay, South Africa (WOC coll.; 22.6 x 7.8 mm).

deeper spiral grooves which produce regular, somewhat elevated and rounded spiral cords (worn flat in beach specimens), which number from 5-7 on the penultimate and from 14-17 on the body whorl; the spiral grooves are finely axially striate and the base of the shell has 5-9 oblique but weak cords. Aperture in adult specimens either slightly longer or shorter than the spire, narrow and smooth within; outer lip weakly thickened and simple and descending almost vertically. Columella calloused only anteriorly and with generally 4 oblique folds. Siphonal fasciole slightly longer than in *M. picta*, siphonal notch fairly distinct. Purplish-brown to greyish-brown in colour, beach specimens reddish-brown, ornamented with white axial flames, small spots on cords and sometimes a broad white band at the body whorl suture; siphonal fasciole white; aperture greyish-brown, parietal wall brown, folds and columellar callus white.

Measurements (mm)—

length	width	height of aperture	
29.7	8.6	13.0	Algoa Bay
28.0	10.0	14.4	Simonstown
25.0	8.6	13.3	Lectotype of <i>latruncularia</i>
22.5	8.0	12.2	Jeffreys Bay
18.0	7.0	—	Type of <i>albozonata</i>
8.0	3.0	—	Type of <i>tomliniana</i> (juvenile)

Synonymy—

- 1844 *Mitra latruncularia* Reeve, *Conchologia Iconica*, pl. 21, fig. 166 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 5, pl. 14, figs. 237, 238; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 120, pl. 35, fig. 59; 1932 Turton, *Marine Shells Port Alfred*, p. 45; 1959 Barnard, *Ann. South African Museum*, vol. 45, p. 40.
 1932 *Mitra albozonata* Turton, *Marine Shells Port Alfred*, p. 45, pl. 10, fig. 335 (Port Alfred, South Africa).
 1932 *Mitra perexilis* Turton, *ibid.*, p. 46, pl. 10, fig. 346 (Port Alfred, South Africa) [non Conrad, 1833].
 1933 *Mitra tomlini* Turton, *Errata for Marine Shells Port Alfred*, unpaginated (substitute name for *M. perexilis* Turton, 1933) [non *M. tomlini* Melville, 1925].
 1933 *Mitra tomliniana* Turton, *Journal of Conchology*, vol. 19, p. 370 (substitute name for *M. perexilis* Turton, 1932).

Types—The designated lectotype and 2 syntypes of *M. latruncularia* Reeve, are in the British Museum (NH), no. 1967793, and Turton's types of *M. albozonata* and *M. tomliniana* are in the University Museum, Oxford.

Nomenclature—Dohrn (1861) placed his previously described *M. plebeia* Dohrn, 1860, from the Hawaiian Islands, in the synonymy of *M. latruncularia*. The holotype of *M. plebeia* is very worn and faded and has been tentatively placed in the synonymy of the Indian Ocean *M. maesta* Reeve;

no similar species to *M. plebeia* occurs in the Hawaiian Islands. A printed leaflet entitled "Marine shells of Port Alfred, South Africa, Errata" has been published and printed prior to the article of the same title but without the words "Errata" in the *Journal of Conchology* (1933). A copy of this Errata sheet is inside the British Museum copy of Turton's "Marine shells of Port Alfred", and the sheet has been marked by Turton with the date 14-2-1933. The substitute name *M. tomlini* has been proposed by Turton in this Errata sheet, but was not mentioned again by Turton in the *Journal of Conchology* article.

Records—SOUTH AFRICA: Port Alfred; Jeffreys Bay near Humansdorp coast; Xora, Transkei coast (all USNM); East London (Steiner coll.); Jeffreys Bay (USNM; DMNH; Cernohorsky coll.); N. of Bashee River mouth (USNM); Algoa Bay (AMNH; Powell coll.; Clover coll.); Simonstown (Ackermann coll.; Powell coll.); Still Bay (Barnard, 1959).

Mitra aerumnosa Melville, 1888

(Pl. 307)

Range—Algoa Bay to Saldanha Bay, South Africa.

Remarks—This drab looking species appear to be of rare occurrence, since apart from the type, we have seen no other specimens in museums. According to Barnard (1959), the species does not



Plate 307. *Mitra (Mitra) aerumnosa* Melville.

Figs. 1, 2 Lectotype from Algoa Bay, South Africa (NMW; 22.1 x 8.2 mm).

Figs. 3, 4. Syntype from the same locality; immature specimens (NMW; 21.4 x 8.0 mm).

occur in Natal, and the author also questions the record of "Algoa Bay" whence the types originated. The species has been also recorded from Algoa Bay by Sowerby (1892).

Description—Shell up to 33 mm (about 1¼ inches) in length, elongate-ovate, moderately thin, horny in appearance, sutures distinct and irregular. Whorls 6-7 apart from the protoconch of 2 smooth whorls, spire whorl convex. Early spire whorls occasionally semicancellate, later whorls with punctate spiral striae which number from 8-11 on the penultimate and from 20-30 on the body whorl; spiral striae become sometimes obsolete and uncountable on the body whorl and the lower third or only the siphonal fasciole of the body whorl may have 6-8 weak and oblique cords. Irregular axial growth-striae cover the shell and are usually stronger on the spire whorls. Aperture slightly longer than the spire, narrow and smooth within; outer lip regularly convex, moderately thin and simple. Columella slightly calloused and with 3-4 oblique folds, with the first fold somewhat distant; siphonal fasciole short, siphonal notch not very prominent. Brown in colour, lower half of body whorl usually paler, some specimens with a narrow, central band on the body whorl and irregular, narrow pale streaks descending from the body whorl suture; aperture and columella are brown, and the shell is covered by an orange-brown or chestnut-brown periostracum.

Measurements (mm)—

length	width	height of aperture	
33.0	11.0	—	South Africa
22.1	8.2	11.9	Lectotype of <i>aerumnosa</i>
21.4	8.0	12.6	Syntype of <i>aerumnosa</i>

Synonymy—

- 1888 *Mitra aerumnosa* Melvill, Journal of Conchology, vol. 5, p. 282, pl. 2, fig. 12 (Algoa Bay, South Africa); 1920 Cooke, Proc. Zool. Soc. London for 1919, p. 416 (description of radula); 1959 Barnard, Ann. Sth. African Museum, vol. 45, p. 41, fig. 11a (radula).
 ?1904 *Mitra simplex* Dunker, von Martens, Wiss. Ergeb. Deut. Tiefsee-Exped. "Valdivia", vol. 7, p. 31; 1925 Thiele, Wiss. Ergeb. Deut. Tiefsee-Exped. "Valdivia", vol. 17, p. 185, pl. 20, fig. 22 (worn specimen) [non Dunker, 1846].

Types—The two syntypes of *M. aerumnosa* Melvill are in the National Museum of Wales, Cardiff; the larger, 22.1 mm long specimen which has been figured by Melvill on plate 2, fig. 12, is here designated as the lectotype of *M. aerumnosa*. The type locality is Algoa Bay, South Africa.

Records—SOUTH AFRICA: Algoa Bay (Melvill, 1888; Sowerby, 1892); Table Bay; Dassen Island; Ondekraal, west coast of Cape Peninsula; Langebaan, Saldanha Bay (all Barnard, 1959).

Fossil records—Saldanha Bay, South Africa; Late Tertiary (Haughton, 1932, Trans. Geol. Soc. Sth. Africa, vol. 39, p. 49).

***Mitra subflava* (Kuroda and Habe, 1971)**

(Pl. 308, fig. 1)

Range—Japan.

Remarks—We have seen no specimens of this recently described species. The authors compared their species with *M. chinensis* Griffith & Pidgeon, but judging from the description and type figure, the species is similar to *M. notoensis* (Masuda, 1967), from Noto Peninsula, Miocene of Japan.

Description—"Shell medium in size, thick and solid, elongated fusiform, orange-brown, covered by the dull brown periostracum. Spire elevated rather highly conical and with 9 rather flat whorls, and sutures distinctly impressed. Surface weakly striated, 4 on the earlier whorls and 20 on the penultimate [? error for body whorl] whorl. Body whorl large and high, more than half the shell, gently curved at the periphery. Aperture narrow and long lanceolated in shape, grayish-white within. Outer margin thickened but not crenulated at the edge. Columellar margin covered the rather thick callus, has 5 folds reducing in size downwards." [Original].

Measurements (mm)—

length	width	
39.8	12.0	Holotype of <i>subflava</i>

Synonymy—

- 1971 *Vicimitra subflava* Kuroda & Habe, Sea shells of Sagami Bay, p. 189, pl. 53, fig. 2.

Types—The authors did not state the location of the holotype, which could be either in the Emperor of Japan's private collection or in the National Science Museum, Tokyo. The type locality is Sagami Bay, Japan.

***Mitra notoensis* (Masuda, 1967)**

(Pl. 308, figs. 14, 15)

Range—Miocene of Japan.

Remarks—The species was compared by the author to *M. dainitiensis* (Makiyama), but was differentiated on features of distinct sutures, long aperture and surface sculpture, which in *M. notoensis* consists of 1-2 very faint, fine spiral threads and fine incremental lines on the spire whorls, and faint, fine revolving threads near the base of the body whorl. The dimensions are as follows: length 32.0 mm, width 12.2 mm (holotype); length 17.0 mm, width 7.0 mm (paratype).

Synonymy—

1967 *Strigatella notoensis* Masuda, Trans. Proc. Palaeont. Soc. Japan, N.S., no. 65, p. 9, pl. 2, figs. 20a, b (500 m E. of Fujio, Suzu City, Noto Peninsula, Higashi-Innai formation, Japan, L. Miocene; holotype in Dept. Geology, Tōhoku University, Sendai, no. 4616).

***Mitra dainitiensis* (Makiyama, 1927)**

(Pl. 308, figs 2, 3)

Range—Lower Pliocene of Japan.

Remarks—The original description reads:

"Shell fusiform, rather solid, smooth. Spire elongated, acutely conic, a little higher than the aperture. Protoconch unknown. Whorls about 7, smooth, flattish; suture superficial, uneven; base slightly contracted; outer lip vertical, almost parallel with columella, rounded below, with a smooth thickened edge; columella subvertical, with 4 oblique plaits decreasing in size and space from above; inner lip narrow, sharply defined, spreading over the slightly concave parietal wall. Height 24.0 mm; width 9.7 mm."

Synonymy—

1927 *Strigatella dainitiensis* Makiyama, Mem. Coll. Sci. Kyoto Imp. University, ser. B, vol. 3, no. 1, p. 114, pl. 5, figs. 15, 16 (Dainiti, Tōtōmi, Kakegawa series, Japan, L. Pliocene; holotype in the Geological Institute, Kyoto University, no. 72).

***Mitra hokusimana* Nomura and Zinbo, 1935**

(Pl. 308, figs. 4, 5)

Range—Miocene of Japan.

Remarks—The authors compared the species with *M. dainitiensis* (Makiyama), but distinguished their species on the basis of narrower shape, the presence of basal threads and the apparently weaker columellar folds. The species appears to be a narrower and less mature individual of *M. dainitiensis*. The measurements of the holotype are length 28.0 mm, width 8.0 mm.

Synonymy—

1935 *Mitra* (*Strigatella*) *hokusimana* Nomura & Zinbo, Saito Ho-on Kai Mus. Sendai Res. Bull., no. 6, Geol. no. 3, p. 174, pl. 15, figs. 29a, b (Yanagawa-machi, Fukushima-ken,

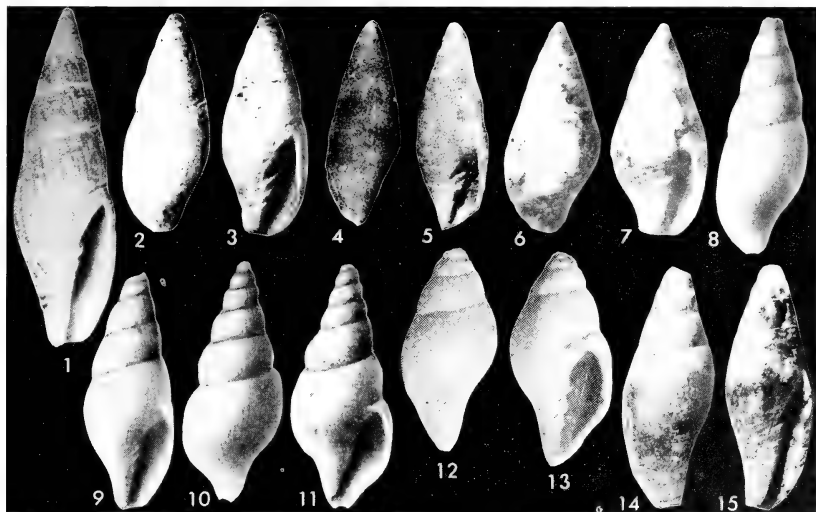


Plate 308. Japanese Recent and fossil Mitrinae.

- Fig. 1. *Mitra* (*Mitra*) *subflava* (Kuroda and Habe). Sagami Bay, Japan (from Kuroda & Habe, 1971, pl. 53, fig. 2).
 Figs. 2, 3. *M. (M.) dainitiensis* (Makiyama). Dainiti, Tōtōmi, L. Pliocene of Japan (holotype from Makiyama, 1927, pl. 5, figs. 15, 16; 24.0 x 9.7 mm).
 Figs. 4, 5. *M. (M.) hokusimana* Nomura and Zinbo. Yanagawa-machi, Hokusima Basin, Miocene of Japan (holotype from Nomura & Zinbo, 1935, pl. 15, figs. 29a, b; 28.0 x 8.0 mm).
 Figs. 6, 7. *M. (M.) ishidae* Masuda. Noto Peninsula, Higashi-Innai formation, L. Miocene of Japan (holotype from Masuda, 1967, pl. 2, figs. 12a, b; 9.6 x 4.3 mm).

- Figs. 8, 9. *M. (M.) kurakiensis* Hatai and Nisiyama. Koshiba, Lower Musashino, Pliocene of Japan (holotype from Yokoyama, 1920, pl. 2, figs. 6a, b; c. 24.0 mm).
 Figs. 10, 11. *M. (M.) cosibensis* Otuka, Koshiba, Lower Musashino, Pliocene of Japan (holotype from Yokoyama, 1920, pl. 2, figs. 4a, b; 7.0 x 3.0 mm).
 Figs. 12, 13. *M. (M.) takii* Ozaki, Tyōsai City, Iioka formation, Pliocene of Japan (holotype from Ozaki, 1958, pl. 15, figs. 9, 10; 14.0 x 7.0 mm).
 Figs. 14, 15. *M. (M.) notoensis* (Masuda). Noto Peninsula, Higashi-Innai formation, L. Miocene of Japan (holotype from Masuda, 1967, pl. 2, figs. 20a, b; 32.0 x 12.2 mm).

Hukusima Basin, Japan, Miocene; holotype in Saito Ho-on Kai Museum, Sendai, no. 6169; 1952 Hatai & Nisiyama, Sci. Repts. Tōhoku Univ. Sendai, ser. 2, Geol., Spec. vol. 3, p. 215.

1967 *Mitra hukusimana* Nomura & Zinbo, Masuda, Trans. Proc. Palaeont. Soc. Japan, N. S., no. 65, p. 9, pl. 2, figs. 9a, b; 10a, b.

***Mitra ishidae* Masuda, 1967**

(Pl. 308, figs. 6, 7)

Range—Miocene of Japan.

Remarks—The species was compared by the author to *M. hukusimana* Nomura & Zinbo, but was said to differ from this species in features of shorter shell, larger spire angle, sculptured surface and 3 columellar folds. The dimensions given for *M. ishidae* are: length 9.6 mm, width 4.3 mm (holotype); length 15.0 mm, width 6.5 mm (paratype).

Synonymy—

1967 *Mitra ishidae* Masuda, Trans. Proc. Palaeont. Soc. Japan, N. S., no. 65, p. 8, pl. 2, figs. 11, 12a, b (near Kōeiji Temple, Ōtani, Suzu City, Noto Peninsula, Higashi-Innai formation, Japan, L. Miocene; holotype in Dept. Geology, Tōhoku University, Sendai, no. 4609).

***Mitra kurakiensis* Hatai and Nisiyama, 1952**

(Pl. 308, figs. 8, 9)

Range—Pliocene of Japan.

Remarks—This is yet another species which is similar to *M. dainitiensis*. Yokoyama's original description is as follows:

"A single specimen lacking the apex. In a perfect state, it may have measured about 24 mm in height. The whorls are smooth, plano-convex, separated by deep, impressed sutures. The columellar folds number four, the lowest being the smallest and somewhat indistinct. In the lower part of the body whorl, transverse striations are faintly visible which seem to have been mostly obliterated by friction".

Synonymy—

1920 *Mitra fusiformis* (Brocchi), Yokoyama, Journal Coll. Sci. Tokyo Imp. Univ., vol. 39, p. 47, pl. 2, figs. 6a, b (Koshiba, Miura Peninsula, Lower Musashino, Japan, Pliocene; holotype in the Geological Institute, University of Tokyo) [non *Voluta fusiformis* Brocchi, 1814; nec *Mitra fusiformis* Borson, 1820].

1952 *Mitra kurakiensis* Hatai & Nisiyama, Sci. Repts. Tōhoku Univ. Sendai, ser. 2, Geol., Spec. vol. 3, p. 215 (substitute name for *M. fusiformis* Yokoyama, 1920); 1954 Taki & Oyama, Palaeont. Soc. Japan, Spec. paper no. 2, p. 23, pl. 3, figs. 6a, b.

***Mitra cosibensis* Otuka, 1937**

(Pl. 308, figs. 10, 11)

Range—Pliocene of Japan.

Remarks—The figured type, 7.0 mm in length and 3.0 mm in width, appears to be a broad, juvenile form of *M. kurakiensis*. Otuka (1949) pointed out that the two species may be synonymous since many transitional forms are found between the two species. Should Otuka's assumption prove to be correct, *M. kurakiensis* Hatai & Nisiyama, 1952, would become a synonym of *M. cosibensis*.

Synonymy—

1920 *Mitra ebenus* Yokoyama, Journ. Coll. Sci. Tokyo Imp. Univ., vol. 39, p. 47, pl. 2, figs. 4a, b (Koshiba, Miura Peninsula, Lower Musashino, Japan, Pliocene; unique holotype in the Geol. Institute, University of Tokyo [non *M. ebenus* Lamarck, 1811]).

1937 *Mitra cosibensis* Otuka, Bull. Earthquake Res. Inst. Tokyo Imp. Univ., vol. 15, pt. 4, p. 1020 (substitute name for *M. ebenus* Yokoyama, 1920); 1952 Hatai & Nisiyama, Sci. Repts. Tōhoku Univ. Sendai, ser. 2, Geol. Spec. vol. 3, p. 215; 1954 Taki & Oyama, Palaeont. Soc. Japan Spec. Paper No. 2, p. 23, pl. 3, figs. 4a, b (as *M. consibensis* on plate explanations).

1949 *Mitra yokoyamai* Otuka, Japan. Journ. Geol. Geog. Trans., vol. 21, p. 303 (substitute name for *M. ebenus* Yokoyama, 1920); 1961 Hanzawa, Asano & Takai, Palaeont. Soc. Japan 25th Anniv. vol. 25, p. 169 (non *Mitra* (*Scabricola*) *yokoyamai* Nomura, 1935).

1973 *Mitra* (*Vicimitra*) *cosibensis* Otuka, Palaeont. Soc. Japan Spec. Papers No. 17, p. 47, pl. 14, fig. 23.

***Mitra takii* Ozaki, 1958**

(Pl. 308, figs. 12, 13)

Range—Pliocene of Japan.

Remarks—The type figure depicts a small, imperfect and juvenile species of *Mitra*. The original description is as follows:

"Shell small, fusiform, spire not high, with 4 whorls (protoconch lost); suture distinct but not deep; whorls smooth, flatly convex; aperture elongate; outer lip broken, inner lip smooth, without any callus; columella nearly straight, with 3 conspicuous oblique folds, of which the uppermost one is the strongest. Height 14.0 mm, width 7.0 mm, height of aperture 8.5 mm.

Synonymy—

1958 *Mitra takii* Ozaki, Bull. Nat. Sci. Museum Tokyo, vol. 4, p. 154, pl. 15, figs. 9, 10 (500 m S.W. of Tokoyodamati, Tyosai City, Iioka formation, Japan, Pliocene; holotype in National Science Museum, Tokyo, no. 4471).

New Zealand Tertiary species

Mitra hectori Hutton, 1905

(Pl. 309)

Range—Eocene of New Zealand.

Remarks—The species has been assigned to the genus *Clifdenia* Laws, 1932, by Fleming (1966), but the species is a typical *Mitra* s. str., which bears some resemblance to Miocene-Recent species of the *M. swainsonii* group. *Clifdenia turneri* Laws, the type of the genus *Clifdenia*, has very deeply recessed columellar folds and a prominent columellar callus pad which spills over onto the body whorl, characters found in some volutid genera but not recorded in any Mitridae.

M. hectori will reach a length of 75 mm, the whorls are almost flat or slightly convex and the sutures are narrowly canaliculate. Sculpture consists of distant, shallow and smooth spiral grooves which frequently become obsolete on the last 3 whorls, but whenever present, are confined to the sutural area. In some specimens very fine longitudinal growth-striae are visible and the base of the shell has up to 18 oblique cords. The aperture is about equal in height to the spire, narrow and smooth within, the outer lip is only moderately thickened, constricted anteriorly and simple; the columella is weakly calloused and the 4 oblique folds are prominent and situated towards the marginal callus.

Measurements (mm)—

length	width	height of aperture	
49.5+	17.5	33.8	McCullough's bridge
45.0	13.0	22.0	Holotype of <i>hectori</i>

Synonymy—

1905 *Mitra hectori* Hutton, Trans. Proc. New Zealand Institute, vol. 37, p. 473, pl. 44, fig. 2 (Waihao, near coal mine, New Zealand, M. Eocene; holotype in Canterbury Museum, Christchurch).

1915 *Mitra (Cancilla) hectori* Hutton, Suter, N.Z. Geolog. Surv. Paleont. Bulletin, no. 3, p. 20.

1966 *Clifdenia hectori* (Hutton), Fleming, N.Z. Dept. Sci. Ind. Res. Bulletin, no. 173, p. 64.

Records—NEW ZEALAND: Hampden, Otago, M. Eocene (AIM); McCullough's Bridge, Sth. Canterbury, M. Eocene (AIM).



Plate 309. *Mitra (Mitra) hectori* Hutton.

Fig. 1. Holotype figure of *M. hectori* Hutton from Waihao, M. Eocene of New Zealand (from Hutton, 1905, pl. 44, fig. 2; 45.0 x 13.0 mm).

Fig. 2. Specimen from McCullough's Bridge, M. Eocene of New Zealand; missing spire whorls (AIM; 49.5+ x 17.5 mm).

**Indo-Pacific species tentatively
assigned to *Mitra* s. str.**

Some of the species tentatively retained in the subfamily Mitrinae exhibit at times morphological characters more compatible with species of the genus *Scabricola* Swainson, in the subfamily Imbricariinae. The spiral sculpture is however, more discreet, and only an examination of the radular anatomy will decide the correct generic location.

***Mitra fulgurita* Reeve, 1844**

(Color pl. 255, fig. 14; pl. 310)

Range—Indonesia to the Philippine Islands and New Guinea.

Remarks—Reeve's description of the species was based on an atypical individual with elongated whorls, a slender shell and short aperture. The typical form, described later under the names *M. nympa* Reeve and *M. filius* Melvill, has an ornamentation consisting of 2 broad bands on the body whorl which are usually broken up into axial flames through the intrusion of the yellowish-cream base colour. A colour variant with additional spiral rows of small brown spots has recently been described as *M. yaekoe* (Habe & Kosuge). Although rare during the last century, more specimens are being collected, particularly in the Philippines, and the *yaekoe* colour form is more frequently encountered in that region than the typical form. The habitat and anatomy of the species remain unknown. The species has been erroneously reported by Dall (1889) from the Caribbean region.

Description—Shell up to 55 mm (about 2¼ inches) in length, fusiformly-ovate to cylindrically elongate-ovate, solid, sutures on the spire whorls sometimes narrowly channeled but on the last 2-3 whorls more adpressed. Whorls 7½-9 apart from protoconch, spire whorls either regularly convex or convex only on the presutural ramp and then descending almost vertically. Sculptured with spiral rows of close-set, small pittings which number from 5-8 on the penultimate and from 16-25 on the body whorl; obsolete longitudinal striae occasionally cross spirals and are usually visible as short axial lirae near the sutures where they cross 2-4 of the spirals. Aperture slightly shorter or longer than the spire, narrow and smooth within, outer lip moderately thickened and almost straight, anterior margin of outer lip with small, weak and almost obsolete crenulations. Columella weakly calloused posteriorly,

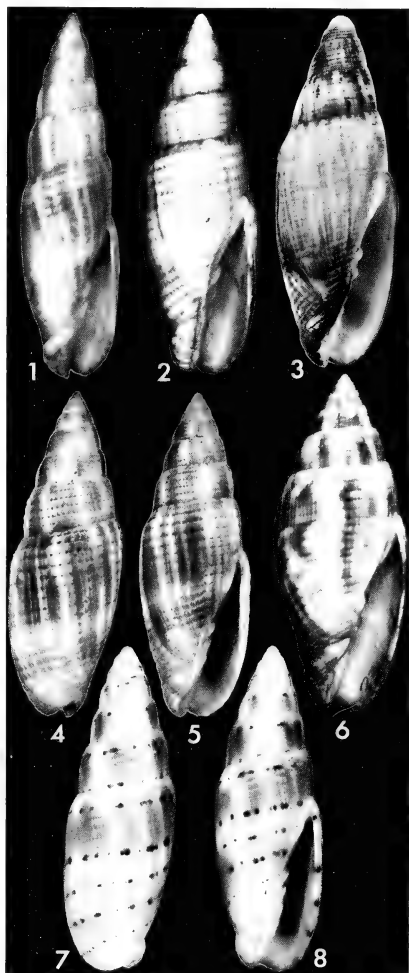


Plate 310. *Mitra (Mitra) fulgurita* Reeve.

Fig. 1. Holotype of *M. fulgurita* Reeve; atypical, fusiform specimen (BM (NH) 1967764; 54.6 x 14.7 mm).

Fig. 2. Syntype of *M. nympa* Reeve (BM (NH) 1967824; 50.9 x 17.0 mm).

Fig. 3. Holotype of *M. filius* Melvill (BM (NH) 196580; 30.9 x 11.0 mm).

Figs. 4, 5. Specimen from Ceylon (NMW; 36.3 mm).

Fig. 6. Holotype of *M. barruwilsoni* (J. Cate); juvenile specimen (WAM 334-66; 39.0 x 15.6 mm). A full, valid species, but not in the Mitrinae. See part 2 of this monograph to come.

Figs. 7, 8. Specimen from the Philippine Islands; spotted form *yaekoe* Habe and Kosuge (NMW; 38.9 mm).

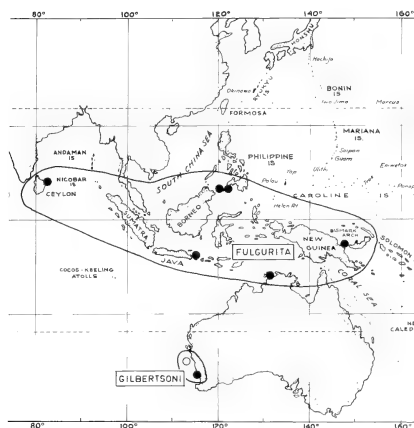


Plate 311. Geographical distribution of *Mitra (Mitra) fulgurita* Reeve.

callus more prominent on the lower half of the columella which has 4-6 oblique folds. Siphonal canal straight but calloused in mature specimens, siphonal fasciole with 6-9 weak, oblique cords, siphonal notch distinct. White, cream or cream-yellow in colour, ornamented with yellowish-brown or orange-brown, broad axial streaks on the spire whorls, and two broad, irregular and occasionally obsolete bands of the same colour on the body whorl; the transverse zones are usually interrupted by axial streaks of the protruding base colour, and in the colour form *yaekoa* the spire whorls have 1 or 2 rows of small dark brown spots and the body whorl 3-5 rows. Aperture cream to light yellow in colour, columella cream, occasionally flushed with orange-brown on the anterior callus. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
54.6	14.7	24.4	Holotype of <i>fulgurita</i>
50.9	17.0	26.0	Syntype of <i>nympha</i>
48.7	16.3	26.2	Bali, Indonesia
41.0	14.2	24.4	Aramot I., New Guinea
37.8	12.0	20.0	Laminusa, Philippines
37.7	12.0	—	Holotype of <i>yaekoa</i>
30.9	11.0	17.5	Holotype of <i>filius</i>

Synonymy—

- 1844 *Mitra fulgurita* Reeve, *Conchologia Iconica*, vol. 2, pl. 9, fig. 61 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 4, pl. 5, fig. 63; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 118, pl. 34, fig. 43.
1845 *Mitra nympha* Reeve, *Conchologia Iconica*, vol. 2, pl. 31,

- fig. 249 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 2, pl. 12, fig. 189.
1925 *Mitra filius* Melvill, *Proc. Malac. Soc. London*, vol. 16, p. 215, pl. 10, fig. 2 (no locality given).
1966 *Nebularia yaekoa* Habe & Kosuge, *Shells World in Colour*, vol. 2, p. 76, pl. 28, fig. 34 (*nomen nudum*).
1966 *Nebularia yaekoa* Habe & Kosuge, *Venus: Jap. Journ. Malacology*, vol. 24, no. 4, pp. 319, 333, pl. 29, fig. 10 (Zamboanga, Mindanao, Philippines).

Types—The holotype of *M. fulgurita* Reeve, B.M. (NH) no. 1967764, and the holotype of *M. filius* Melvill, B. M. (NH) no. 196580, are in the British Museum (NH). Two syntypes of *M. nympha* Reeve, are also in the British Museum (NH) no. 1967824; these two syntypes are conspecific with *M. fulgurita*, but neither of these two specimens shows the distinct colour pattern depicted in Reeve's original figure, and the band-like colour ornamentation has faded to an orange-yellow in the syntypes. The holotype of *M. yaekoa* (Habe & Kosuge), is in the National Science Museum, Tokyo. No locality was given by Reeve for *M. fulgurita*, and we designate Laminusa, Siasi, Philippine Islands, as the type locality (specimens in various collections).

Records—CEYLON: (NMW). INDONESIA: Bali (ZMC). PHILIPPINE ISLANDS: Zamboanga Bay (NMW); Zamboanga, Mindanao (Habe & Kosuge, 1966); Laminusa, Siasi (Dan coll.; Eker coll.; Cernohorsky coll.). NEW GUINEA: Aramot I., Siasi Island (Hinton coll.; Cernohorsky coll.); Rabaul, New Britain (Max Marrow, coll.).

Mitra junghuhni K. Martin, 1880

(Pl. 312)

Range—Upper Miocene of Java; ? Pliocene of Java, Indonesia.

Remarks—The identity of the species has not been satisfactorily elucidated. Martin's description was based on a specimen with most of the spire whorls missing, and his original diagnosis does not appear to agree with descriptions and illustrations of subsequent authors. Both Tesch (1915) and Oostingh (1939), stated that they compared their specimens with the holotype of *M. junghuhni*, but their respective illustrations are not very similar. The 90.0 mm long specimen figured by Tesch as *M. junghuhni*, is the species *M. subscrobiculata* d'Orbigny, while Oostingh's figures are similar to the Miocene *M. tittabawensis* Vredenburg. The translated and abridged, original description is as follows:

"Shell spindle-shaped, consisting of a few, convex whorls, aperture about equal in height to the spire, sutures with a shallow channel. The com-

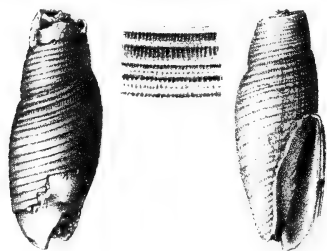


Plate 312. *Mitra (Mitra) junghuhni* K. Martin, Tjilaoteureun, U. Miocene of Java (from K. Martin, 1880, pl. 6, figs. 1a, b).

plete surface is covered with sharply incised spiral striae which are close-set and are cut by longitudinal striae which are quite distinct in the interstices; the width of the spiral interspaces is very variable. Aperture long and narrow, columellar callus elevated, outer lip thick and simple. Columella with 5 folds, last anterior fold very small. There are remains of a brown colouring on

the shell". No dimensions were given by Martin.

Synonymy—

1880 *Mitra junghuhni* Martin, Tertiarschichten auf Java, p. 27, pl. 6, figs. 1, 1a, b (locality R. Tjilaoteureun, Java, Indonesia, U. Miocene; type-specimen in Rijksmuseum, Leiden).

1939 *Mitra (Tiara) junghuhni* Martin, Oostingh, Ingen. Nederl.-Indie, vol. 6, p. 8, pl. 10, figs. 176, 177a, b (Tjikeusik, Bantam, Java; Pliocene).

Mitra granatinaeformis K. Martin, 1884

(Pl. 313, figs. 1, 2)

Range—Miocene of India, Burma, Indonesia and the Ryukyu Islands; Pliocene of Sumatra.

Remarks—The species has regularly convex whorls which are sculptured with 4-5 spiral grooves on the penultimate whorl; the resulting cords are not prominently elevated on the spire whorls and obsolete apart from spiral grooves on the body whorl. Fine longitudinal striae bisect the spiral grooves, striae usually more prominent anteriorly to the sutures, columella with 4 oblique folds.

Martin's *M. granatinaeformis* was described from an immature specimen, while *M. martini* Pannekoek, was based on an adult of the same species. The latter taxon is a homonym of *M. martini* Böttger, 1882, and *M. martini* Philippi, 1887.

Measurements (mm)—

length	width	
c.32.0	—	Type-figure of <i>granatinaeformis</i>
28.0	—	Type specimen of <i>martini</i>
24.0	9.9	Okinawa; Miocene
9.5	4.0	Assam, India; Miocene

Synonymy—

1884 *Mitra granatinaeformis* Martin, Samml. geol. Reichsmus. Leiden, ser. 1, vol. 3, p. 86, pl. 5, fig. 87 (Ngembak, Batavia, Java, Miocene; type in Rijksmuseum Leiden) [juvenile specimen]; 1923 Vredenburg, Rec. geol. Surv. India, vol. 54, p. 273; 1928 Martin, Wet. Meded. Dienst Mijnb., no. 10, p. 10; 1939 Mukerjee, Mem. geol. Surv. India, N.S., vol. 28, no. 1, p. 65, pl. 3, fig. 25.

1925 *Mitra inquinata* Reeve, Vredenburg, Mem. Geol. Surv. India, vol. 1, p. 148, pl. 1, figs. 15a, b (non Reeve, 1844).

1936 *Mitra (Mitra) martini* Pannekoek, Geol. Inst. Meded. Univ. Amsterdam, no. 60, p. 37, pl. 1, fig. 15 (Ngampel or Panowan, Rembang formation, Java, L. Miocene; type specimen in Rijksmuseum Leiden ?) [non *M. martini* Böttger, 1882, nec Philippi, 1887].

1960 *Mitra (Cancilla) cf. M. (C.) granatinaeformis* Martin, MacNeil, U.S. Geol. Surv. Prof. Paper, no. 339, p. 94, pl. 4, figs. 20, 22 only.

Records—INDIA: West of Ghark Hill, Mekran beds, Talar section, U. Miocene (Vredenburg, 1925—as *M. inquinata*); Garo Hills, Assam, L. Miocene (Mukerjee, 1939). BURMA: Kyudawan and Myauktin, M. Miocene (Vredenburg, 1923). INDONESIA: Ngembak, Batavia, Java, Miocene (Martin, 1884); Ngampel or Panowan, Rembang formation, Java, L. Miocene (Pannekoek, 1936); Atjeh, N. Sumatra, Pliocene (Martin, 1928). RYUKYU ISLANDS: Okinawa, Yonabaru clay member, L. Miocene (MacNeil, 1960).

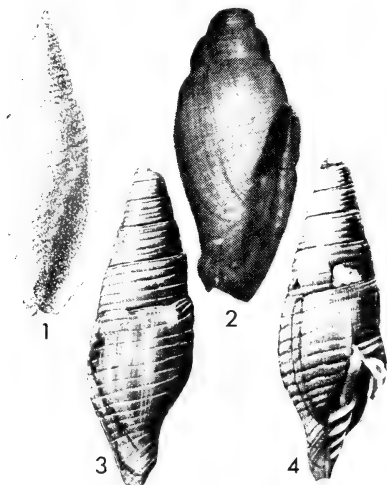


Plate 313. Figs. 1, 2. *Mitra (Mitra) granatinaeformis* K. Martin. Figs. 3, 4. *M. (M.) arntzenii* K. Martin.

Fig. 1. Type figure of *M. granatinaeformis* K. Martin from Ngembak, Batavia, Miocene of Java; juvenile specimen (from K. Martin, 1884, pl. 5, fig. 87; c. 32.0 mm).

Fig. 2. Type figure of *M. martini* Pannekoek from Ngampel, Rembang formation, Miocene of Java (from Pannekoek, 1936, pl. 1, fig. 15; 28.0 mm).

Figs. 3, 4. Type figure of *M. arntzenii* K. Martin from Kembarang Sokkoh, West Progo beds, Miocene of Java; c. 13.0 mm).

Mitra arntzenii K. Martin 1916

(Pl. 313, figs. 3, 4)

Range—Lower Miocene of Java, Indonesia.

Remarks—The species is related to *M. granatinaeformis* K. Martin. The freely translated description is as follows:

"A slender species with an aperture shorter than half the length of the shell, protoconch missing. Central whorls separated by impressed sutures, sculptured with 5 slightly rounded and close-set spiral threads, one of which is covered by the suture. The spiral grooves are finely axially striate or punctate, and diminish in width on the body whorl where the punctate sculpture becomes obsolete or disappears. The siphonal fasciole is spirally corded and the columella has 4 sharp folds which decrease in size anteriorly; the outer lip is not preserved and the canal is constricted anteriorly. Length about 13.0 mm".

Synonymy—

1916 *Mitra* (s. str.) *arntzenii* Martin, Samml. geol. Reichs-Mus. Leiden, N. F., vol. 2, pt. 6, p. 236, pl. 1, figs. 28, 28a (Kembang Sokkoh, West Progo beds, Java, Indonesia, L. Miocene; type-specimen in Rijksmuseum Leiden).



Plate 314. *Mitra* (*Mitra*) *gilbertsoni* (J. Cate). Holotype from N. W. of Rottnest Id., near Fremantle, West Australia, 19½ fms.; immature specimen (WAM 1129-67; 46.4 x 19.0 mm).

Mitra gilbertsoni (J. Cate, 1968)

(Pl. 314)

Range—West Australia.

Habitat—On a sand and coral substratum, from 19½ to 24 fathoms.

Description—Shell up to 52 mm (about 2 inches) in length, cylindrically-ovate and inflated, solid and heavy, sutures distinct, narrowly channelled on the spire whorls, irregular and minutely serrated through bisecting axial striae. Whorls 8-8½, apart from the protoconch of 1½ small nuclear whorls, first 2 post-nuclear whorls with 3 shallow spiral grooves which are obsoletely pitted, later whorls with 3-4 more deeply incised spiral grooves which are crossed by irregular axial striae; on the body whorl, 3 prominent and obsoletely pitted spiral grooves are confined to the shoulder of the whorl and are followed by up to 15 very shallow and minutely punctate spiral grooves, base of shell with 4-5 weak cords. Aperture longer than the spire, only moderately narrow, smooth within, outer lip regularly convex, moderately thickened and simple. Columella calloused, and with 5-6 strong, oblique folds, siphonal canal straight and slightly calloused, siphonal notch prominent. Uniformly fawn in colour under a moderately opaque, thin, light tan periostracum, ornamented with two very faint tan broad bands on the body whorl and small white axial spots and streaks near the sutures; aperture and columella porcellaneous-white.

Measurements (mm)—

length	width	height of aperture	
51.6	20.4	32.7	Paratype of <i>gilbertsoni</i>
46.4	19.0	28.8	Holotype of <i>gilbertsoni</i>

Synonymy—

1968 *Pterygia gilbertsoni* J. Cate, Veliger, vol. 11, p. 85, pl. 11, figs. 1a-d.

Types—The holotype is in the Western Australian Museum, Perth, no. 1129-67; the specimen is immature, with a thin outer lip, and is more inflated and broader than the more mature paratype. The type locality is 5 miles northwest of Rottnest Island, near Fremantle, West Australia, in 19½ fathoms.

Records—WEST AUSTRALIA: N.W. of Rottnest Island, near Fremantle, 19½ faths. (WAM); N.E. of Eaglenest Island, Easter group, Abrolhos Islands (J. Cate, 1968).

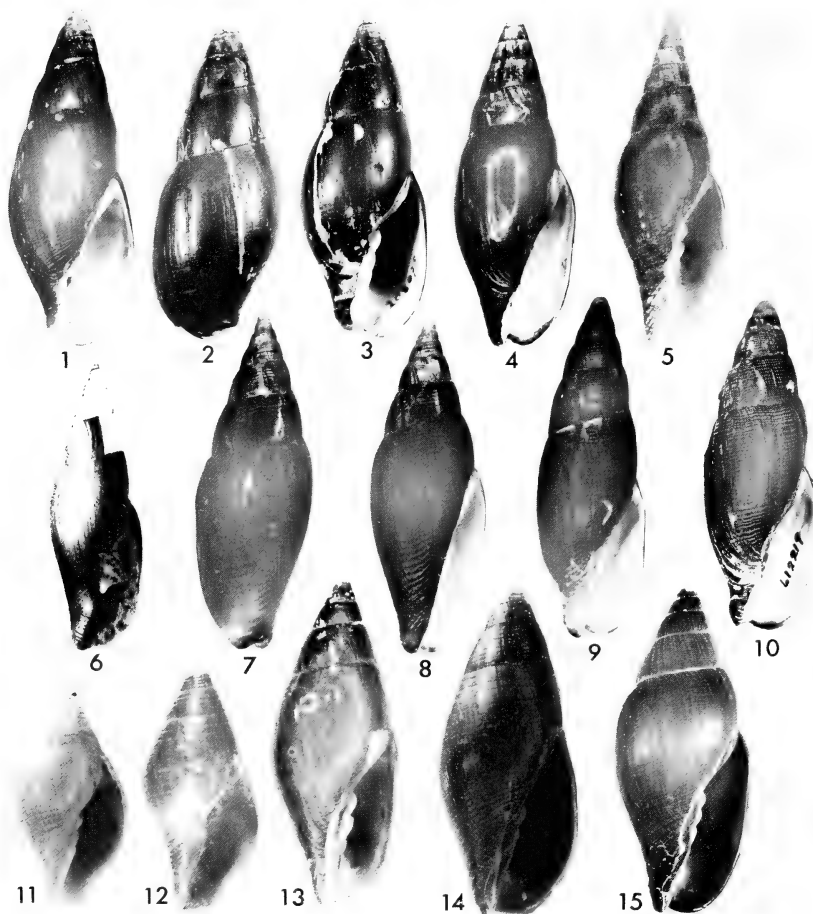


Plate 315. Figs. 1-6. *Mitra (Mitra) orientalis* Griffith and Pidgeon. Figs. 7, 8. *M. (M.) caliginosa* Reeve. Figs. 9-15. *M. (M.) idae* Melvill.

Fig. 1. Syntype of *M. orientalis* Griffith and Pidgeon from Iquique, Chile (BM (NH) 1966417; 56.6 x 21.2 mm).

Figs. 2, 3. Specimen from Peru (USNM 208079; 51.2 x 21.1 mm).

Fig. 4. Holotype of *M. fortis* Melvill (NMW; 57.9 x 21.4 mm).

Fig. 5. Holotype of *M. induta* Sowerby, juvenile specimen (ANSP 28652; 31.3 x 10.9 mm).

Fig. 6. Type figure of *M. martini* Philippi from Chiloe Id., L. Pliocene of Chile (from Philippi, 1887, pl. 8, fig. 5).

Figs. 7, 8. Holotype of *M. (M.) caliginosa* Reeve (BM (NH) 1966718; 34.9 x 12.4 mm).

Fig. 9. Holotype of *M. (M.) idae* Melvill from Point Loma, Lower California (NMW; 60.0 x 19.3 mm).

Fig. 10. Paratype of *M. semiusta* Berry from Point Concep-

tion, St. Barbara County, California (USNM 612219; 55.2 mm).

Fig. 11. Holotype of *M. loweana* Pilsbry from off Avalon, Catalina Id., California; juvenile specimen (USNM 109305; 5.5 x 2.8 mm) [photo courtesy H. A. Rehder, USNM].

Fig. 12. Holotype of *M. coronadoensis* (Baker & Spicer) from Los Coronados Ids., Lower California; juvenile specimen (SDNHM; 13.0 x 6.2 mm) [colour slide courtesy of G. Radwin, SDNHM].

Fig. 13. Lectotype of *M. catalinae* (Dall) from San Pedro, California (USNM 219648; 28.4 x 11.4 mm).

Fig. 14. Lectotype of *M. diegensis* (Dall) from San Diego, California (USNM 252998; 13.2 x 5.3 mm) [photo courtesy of H. A. Rehder, USNM].

Fig. 15. Specimen of *M. idae* from Monterey Bay, California, 20 m; broad, inflated form (ZMC; 49.4 x 21.0 mm).

West American species

Mitra orientalis Griffith and Pidgeon, 1834

(Color pl. 256, fig. 1; pl. 315, figs. 1-6)

Range—Colombia to Chile.

Remarks—The southern limit of distribution is about Valparaíso, Chile, but during the Lower Pliocene, when temperatures were somewhat warmer than at present, the species extended even farther south by at least 10° of Latitude.

Description—Shell up to 75 mm (3 inches) in length, elongate-ovate, body whorl usually inflated, width-ratio 34-41% of length. Sutures distinct but not channeled, whorls 5-7, protoconch usually eroded, spire whorls regularly convex. Smooth in appearance, sculptured with very fine, numerous spiral striae which number up to 30 on the penultimate whorl but become obsolete and uncountable on the body whorl; in some individuals the early spire whorls are prominently granulose, clathrate or spirally corded. Aperture shorter or longer than the spire, height-ratio 47-55% of total length, aperture smooth within; outer lip only moderately thickened and simple, regularly convex or subangulate. Columella calloused in adult specimens, parietal callus slightly more thickened, columella with 4 or 5 oblique folds; siphonal canal straight, siphonal notch distinct, base of shell smooth or with up to 15 weak, oblique cords. Uniformly tan to brown in colour under a blackish-brown periostracum, aperture and columella white or bluish-white, margin of outer lip occasionally edged with greyish-brown.

Measurements (mm)—

length	width	height of aperture	
70.0	24.0	—	Type-specimen of <i>martini</i>
60.0	22.3	29.0	Peru
57.9	21.4	32.0	Holotype of <i>fortis</i>
56.6	21.2	28.6	Syntype of <i>orientalis</i>
51.2	21.1	27.0	Peru
31.3	10.9	16.4	Holotype of <i>induta</i>

Synonymy—

- 1834 *Mitra orientalis* Griffith & Pidgeon, Anim. Kingd. Baron Cuvier, Moll. & Radiata, vol. 12, pl. 40, fig. 5 (no locality given); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 5, fig. 34; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 5, pl. 3, fig. 40; 1909 Dall, Proc. U.S. Nat. Museum, vol. 37, p. 212.
- 1836 *Mitra maura* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Iquiqui, Peru); 1854, Hupé, Hist. fisica y politica de Chile, p. 211; 1882 Tryon, Manual of Conchology, vol. 4, p. 121, pl. 36, fig. 67.
- 1838 *Mitra chilensis* (Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 26, pl. 10, fig. 28 (coasts of Chile)).
- 1875 *Mitra induta* Sowerby, Proc. Zool. Soc. London, p. 128, pl. 24, fig. 9 (no locality given) [juvenile specimen]; 1882 Tryon, Manual of Conchology, vol. 4, p. 121, pl. 36, fig. 70.
- 1887 *Mitra martini* Philippi, Tert. & Quart. Verst. Chiles, p.

- 71, pl. 8, fig. 5 (Ancud, Chiloe Island, Chile; L. Pliocene) [non *M. martini* Böttger, 1882].
- 1925 *Mitra fortis* Melvill, Proc. Malac. Soc. London, vol. 16, p. 215, pl. 10, fig. 5 (probably west coast of S. America, Peru or Chile).
- ?1934 *Mitra* (? *Mitraria*) sp. ind. Rutsch, Abh. Schweizer Palaeont. Gesellschaft, vols. 54 & 55, p. 85, pl. 7, figs. 3, 4 (Punta Gavilan, Venezuela, Miocene; ? Miocene subspecies of *M. orientalis*).
- 1951 *Mitraria fortis* (Melvill), Carcelles & Williamson, Rev. Inst. Nac. Invest. Cienc. Nat. Argentina, vol. 2, no. 5, p. 301.
- ?1964 *Mitra (Atrimitra) mexicana (pars)* Dall, Olsson, Neogene moll. N.W. Ecuador, Paleont. Res. Inst. Ithaca Publ., p. 132, pl. 23, fig. 12a only (Punta Gorda, Esmeraldas formation, Ecuador, L. Miocene or L. Pliocene) [non *Strigatella (Atrimitra) mexicana* Dall, 1919].

Types—Three syntypes of *M. orientalis* Griffith & Pidgeon, which are also the types of *M. maura* Broderip, are in the British Museum (NH) no. 1966417-419. The holotype of *M. fortis* Melvill, is in the National Museum of Wales, Cardiff, and the type-specimen of *M. chilensis* Kiener, could not be found. The holotype of *M. induta* Sowerby, is in the Academy of Natural Sciences, Philadelphia, no. 28652; the accompanying label reads "unique type, ex-Prevost coll., ex-Sowerby". A very similar and also juvenile specimen of closely matching dimensions is in the National Museum of Wales, Cardiff (32.0 x 10.8 x 16.7 mm), with a label "probable type ex-Thomas collection". The ANSP specimen is the type-specimen, since it has only 3 columellar folds as described by Sowerby, whereas the NMW specimen has 4 folds. No local-



Plate 316. Geographical distribution of the species *Mitra* (*Mitra*) *orientalis* Griffith and Pidgeon, and *M. (M.) idae* Melvill.

ity was given for *M. orientalis*, and Broderip's locality indication of Iquique, Peru [= Chile], is designated as the type locality.

Nomenclature—*Mitra martini* Philippi, was described from an incomplete specimen of Lower Pliocene age of Chiloe Island, off the Chilean coast. Philippi's taxon is a homonym of *M. martini* Böttger, 1882, but since Philippi's species appears to be conspecific with the Recent *M. orientalis*, no substitute name is proposed here.

Records—ECUADOR: Ancon (Dall, 1908). PERU: (USNM; LACM); Callao (USNM); E. of Viejas Island, Independencia Bay, 14°14'S & 80°43'30"W, on sand; South Bay, Lobos de Afuera Islands, 6°56'12"S & 80°42'50"W, on rocks (all USC); S. of Cape Aguja, 6°27' to 6°23'S & 80°55'W, 160 m (LACM). CHILE: Sarmenia, Caleta Iquique (USNM); Iquique (BMNH; LACM); Valparaiso (Hupé, 1854); Caldera (MCZ).

Fossil records—LOWER PLIOCENE: Ancud, Chiloe Island, Chile (Philippi, 1887, as *M. martini*).

Mitra idae Melvill, 1893

(Color pl. 256, figs. 2, 3; pl. 315, figs. 9-15)

Range—Crescent City, Northern California to the Farallon Islands and to Cedros Island, Baja California.

Remarks—The species is variable in features of obesity, sculpture and ratio of apertural height to spire height, and consequently has received numerous names. The slender or broad forms of *M. idae* are not confined to any specific region, but as in other species of Mitridae, appear in widely distributed populations. Some of the forms of *idae*, particularly the form *M. montereyi* Berry, closely resemble individuals of the more southern species *M. orientalis* in both form and sculpture. Generally speaking, broad forms of *idae* have a longer outer lip and wider aperture than slender forms, while small and often immature individuals have a narrower aperture and a less angulate and more regularly convex outer lip. The southern species *M. orientalis* differs in features of a more inflated body whorl, a finer sculpture and the absence of interstitial pits on later whorls. According to Chess & Rosenthal (1971), small specimens, 13-15 mm in length, are already sexually mature.

Habitat—Near rocks and under kelp, on gravel, rock, sand or clay substratum, from the intertidal zone to a depth of 300 fathoms.

Description—Shell up to 75 mm (3 inches) in length, fusiformly-ovate to elongate-ovate, sometimes inflated, width-ratio 32-45% of length, solid, sutures distinct and irregular. Whorls 6-7, apart from the protoconch which is usually eroded,

spire whorls regularly convex. Sculptured with spiral grooves which become frequently pitted through bisecting longitudinal striae; the number of spiral striae is fewer in small specimens than in large ones, and striae number from 4-20 on the penultimate and from 11-50 on the body whorl, apart from 8-15 not very prominent oblique cords at the base. Aperture generally longer in small specimens, shorter or longer than the spire in large ones, apertural ratio 44-64% of length, aperture smooth within; outer lip thickened and simple, subangulate and descending almost vertically or regularly convex especially in small specimens. Columella calloused, parietal wall sometimes only glazed and with a small callus pad posteriorly, columella with 3-4 oblique folds; siphonal canal straight or slightly twisted in senile specimens, siphonal notch prominent. Uniformly light brown, greyish-brown or mauve-brown under a blackish periostracum, aperture white or brown, parietal wall brown or with a white callosity, columellar folds white or bluish-white.

Measurements (mm)—

length	width	height of aperture	
72.1	24.0	34.8	Holotype of <i>semiusta</i>
66.5	23.5	33.7	Holotype of <i>montereyi</i>
60.0	19.3	28.3	Holotype of <i>idae</i>
53.5	18.5	26.8	S. of Pt. Conception, California
49.2	20.8	29.4	Monterey Bay, California
37.0	15.3	21.1	Off Pt. Loma, California
28.4	11.4	16.2	Lectotype of <i>catalinae</i>
13.2	5.3	7.6	Lectotype of <i>diegensis</i>
13.0	6.2	8.2	Holotype of <i>coronadoensis</i>
10.5	4.7	6.7	Off Redondo Beach, California
5.5	2.8	—	Holotype of <i>loweana</i>

Synonymy—

- 1857 *Mitra maura* Carpenter in Gould, Proc. Zool. Soc. London, p. 227; 1907 Berry, Nautilus, vol. 21, no. 4, p. 40 (non Broderip, 1836).
 1893 *Mitra idae* Melvill, The Conchologist, vol. 2, p. 140, pl. 1, fig. 6 (Point Loma, Lower California); 1906 Williamson, Proc. Biol. Soc. Washington, vol. 19, p. 195, figs. 1-5; 1920 Berry, Proc. Malac. Soc. London, vol. 14, textfigs. 5, 6; 1927 Oldroyd, Mar. shells w. coast N. America, vol. 2, p. 170, 1931 Grant & Gale, Mem. San Diego Soc. Nat. History, vol. 1, p. 635; 1952 Morris, Field Guide to shells, p. 133, pl. 30, fig. 14, 1954 R. T. Abbott, American Seashells, p. 249, pl. 20, fig. p; 1958 Emerson & Addicot, American Mus. Novitates, no. 1909, p. 7; 1959 Kanakoff & Emerson, Los Angeles County Mus. Contrib. Science, no. 31, p. 28; 1967 J. Cate, Veliger, vol. 10, p. 139, pl. 19, fig. 1 (shell), textfig. 1 (radula); 1969 Carlisle, Veliger, vol. 11, p. 240; 1969 McLean, Marine shells S. California, Science ser. 24, Zoology, no. 11, p. 49, fig. 26, subfig. 7; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, pl. 1, fig. 6 (figured holotype), textfig. 38 (radula); 1971 Chess & Rosenthal, Veliger, vol. 14, p. 172, 8 textfigs. (reproductive biology).

- 1903 *Mitra lowei* Dall, Proc. Biol. Soc. Washington, vol. 16, p. 173 (Santa Barbara Channel, California); 1927 Oldroyd, Mar. shells w. coast N. America, vol. 2, p. 170, pl. 16, fig. 4 (non *M. lowei* Dohrn, 1862).
- 1919 *Strigatella (Atrimitra) catalinae* Dall, Proc. U.S. Nat. Museum, vol. 56, p. 308 (San Pedro, California).
- 1919 *Strigatella (Atrimitra) diegensis* Dall, *ibid.*, p. 309 (San Diego, California).
- 1920 *Mitra montereyi* Berry, Proc. Malac. Soc. London, vol. 14, p. 31, textfigs. 1-4 (off Del Monte, Monterey Bay, California, 12 faths.); 1959 Allison, Veliger, vol. 2, p. 20.
- 1921 *Atrimitra idae* Melvill, Dall, U.S. Nat. Mus. Bulletin, no. 112, p. 86.
- 1921 *Atrimitra idae montereyensis* Berry, Dall, *ibid.*, p. 86 (invalid emendation).
- 1921 *Atrimitra catalinae* Dall, *ibid.*, p. 86.
- 1921 *Atrimitra diegensis* Dall, *ibid.*, p. 86.
- 1921 *Atrimitra ? lowei* Dall, *ibid.*, p. 87, pl. 15, fig. 4.
- 1926 *Strigatella catalinae* Dall, Jordan, Proc. California Acad. Sciences, ser. 4, vol. 15, p. 245.
- 1927 *Mitra idae montereyensis* Berry, Oldroyd, Mar. shells w. coast N. America, vol. 2, p. 171 (invalid emendation).
- 1927 *Mitra catalinae* Dall, Oldroyd, *ibid.*, p. 169; 1931 Grant & Gale, Mem. San Diego Soc. Nat. History, vol. 1, p. 636, pl. 28, fig. 4; 1952 Morris, Field Guide to shells, p. 133, pl. 30, fig. 12; 1959 Kanakoff & Emerson, Los Angeles County Museum Contrib. Science, no. 31, p. 28.
- 1930 *Strigatella (Atrimitra) coronadoensis* Baker & Spicer, Trans. San Diego Soc. Nat. History, vol. 6, p. 176, pl. 19, fig. 1 (Los Coronados Islands, Lower California, Mexico) [juvenile specimen].
- 1931 *Mitra idae* var. *montereyi* Berry, Grant & Gale, Mem. San Diego Soc. Nat. History, vol. 1, p. 635.
- 1931 *Mitra loweana* Pilsbry, Nautilus, vol. 45, no. 1, p. 29 (substitute name for *M. lowei* Dall, 1903).
- 1957 *Mitra semiusta* Berry, Leaflets in Malacology, vol. 1, no. 14, p. 80 (off Point Conception, Santa Barbara County, California, 15 metres).
- 1963 *Mitra (Atrimitra) idae* Melvill, Shikama, Sel. shells world illust. colours, vol. 1, pl. 74, fig. 16; 1968 J. Cate, Veliger vol. 10, p. 247, figs. 1-8 (animal and egg-capsules).

Types—The holotype of *M. idae* Melvill, is in the National Museum of Wales, Cardiff, and the holotype of *M. coronadoensis* Baker & Spicer, is in the San Diego Natural History Museum, San Diego. The holotype of *M. loweana* Pilsbry, USNM no. 109305 (locality label reads "off Avalon, Catalina Island, California"), and the syntypes of *M. catalinae* (Dall) and *M. diegensis* (Dall), are in the National Museum of Natural History, Washington. Dall did not segregate the holotypes of the last two mentioned species, and Sphon's 1961 lectotype selection was only on museum labels. We therefore select the specimen measuring 28.4 x 11.4 x 16.2 mm, USNM no. 219648, as the lectotype of *M. catalinae*, and specimen measuring 13.2 x 5.3 x 7.6 mm, USNM no. 252998, as the lectotype of *M. diegensis*. The type specimens of *M. montereyi* Berry and *M. semiusta* Berry, are in the private collection of S. S. Berry, Redlands, California. The type locality of *M. idae* is Point Loma, Lower California.

Nomenclature—A comparison of the ratio of width, length and height of aperture: length for *M.*

orientalis and *M. idae*, show that both species fall within the same variational range in obesity and apertural height. Sphon equalled Dall's types of *M. catalinae* and *M. diegensis* (MS on label accompanying the types) to *M. idae*, and McLean (1969) placed *catalinae*, *diegensis* and *montereyi* in the synonymy of *M. idae*, which in our opinion is quite appropriate. We have examined paratypes of *M. semiusta* in the USNM collection, and failed to find any characters on which to base a valid separation from *M. idae*. Broad and intermediate specimens of *M. idae*, some of them resembling the southern *M. orientalis*, have been dredged in 95-135 fathoms off Point Loma, in 75 fathoms off Point Arena, California and in 20 metres in Monterey Bay; some of these specimens show the finely reticulated sculpture of *M. idae*, while others have the fine spiral sculpture of *M. orientalis*.

Records—CALIFORNIA: Crescent City (Dall, 1921); off Point Arena, 75 faths., 48.4°F (USNM); Farallon Islands (Oldroyd, 1927); Monterey Bay, 20 m (ZMC); off Estero Bay, 92 faths.; off Point Conception, 44 faths. (both USNM); 5 mi. S. of Point Conception, 8 faths. (Cernohorsky coll.); Santa Barbara (USNM; DMNH); off Naples reef, near Santa Barbara, 8 faths. (Cernohorsky coll.); Anacapa Passage, Channel I, 27 faths. (USNM); off Redondo beach (DMNH; AIM); Point Firmin (Powell coll.); San Pedro Bay (USNM; DMNH; AIM; Powell coll.); Catalina Harbour (USNM); Catalina Island (USNM; DMNH; Powell coll.); off Avalon, Catalina Island (USNM); Newport beach (Powell coll.); Laguna beach (AIM); La Jolla (ZMC); San Diego (USNM; DMNH; Powell coll.); Point Loma, San Diego (USNM; Powell coll.); off Point Loma, San Diego, 95-135 faths. (USNM). BAJA CALIFORNIA: Cortez Bank, 60 faths. (USNM); Los Coronados Islands (SDNHM); Cedros Island (McLean, 1969).

Fossil records—PLIOCENE: Holser Canyon, N. of Santa Clara valley; Elsmere Canyon, Los Angeles County; Fifth and Hope Streets, Los Angeles; near Ventura, "Lower Pico", all California (Grant and Gale, 1931). PLEISTOCENE: San Pedro, Lower San Pedro series; Deadman Island, Upper San Pedro series; Crawford George's, Los Angeles County; San Diego, all California (Grant and Gale, 1931); Newport Bay, California (Kanakoff and Emerson, 1959); San Quintin's Bay, Baja California, Mexico (Jordan, 1926); Punta Baja, Baja California, Mexico (Emerson & Addicott, 1958).

Mitra semigranosa von Martens, 1897 (Pl. 317)

Range—Ecuador to Chile.

Remarks—This is a rare species which is lacking in museum collections. It is closely related to the common *M. orientalis* but has a more granulose sculpture on the spire whorls which may persist to the penultimate whorl. The description is based on the holotype which was collected devoid of animal and lacks the periostracum which is probably present in living specimens.

Habitat—Unknown.

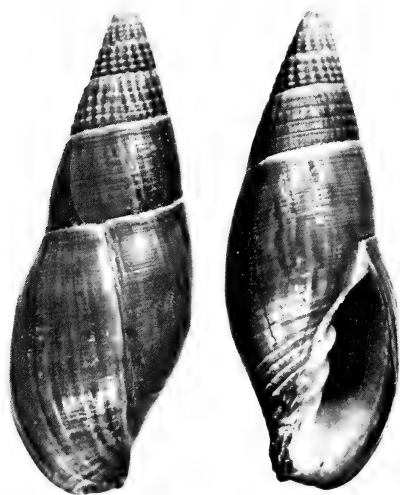


Plate 317. *Mitra (Mitra) semigranosa* von Martens. Holotype from west coast of South America (ZMB: 46.0 x 17.6 mm) [photo courtesy of R. Kilias, ZMB].

Description—Shell 46 mm (about 2 inches) in length, elongate-ovate and solid, sutures distinct and slightly adpressed on the body whorl. Whorls 6 apart from the protoconch which is missing; post-nuclear whorls with axial riblets and 4 overriding spiral threads which produce horizontally elongated, narrow beads upon the ribs. The beaded sculpture disappears on the second half of the penultimate whorl and is replaced by fine and numerous spiral striae; striae number about 20 on the penultimate and about 30 on the body whorl in addition to a dozen oblique cords at the base. The body whorl has obsolete and ill-defined axial threads which resemble growth-striae. Aperture slightly longer than the spire, moderately open and smooth within, outer lip moderately thickened and simple, regularly convex; columella calloused, thinned on the parietal wall but with a small callus-pad near the juncture of the aperture, columella with 4 strong, oblique folds. Siphonal fasciole straight, siphonal notch distinct. Uniformly brown in colour, sutures slightly paler, aperture white but margined with brown, columellar folds white.

Measurements (mm)—

length	width	height of aperture	
46.0	17.6	24.0	Holotype of <i>semigranosa</i>

Synonymy—

1897 *Mitra semigranosa* von Martens, Archiv f. Naturgeschichte, vol. 63, p. 178, pl. 16, figs. 24, 25 (west coast of Sth. America); 1909, Dall, Proc. U.S. Nat. Mus., vol. 37, p. 212.
1951 *Mitraria semigranosa* (von Martens), Carcelles & Williamson, Rev. Inst. Nac. Inv. Cienc. Nat. Argentina, vol. 2, no. 5, p. 301.

Types—The holotype of *M. semigranosa* von Martens, is in the Zoological Museum of the Humboldt University, Berlin. The type locality is west coast of South America.

Records—SOUTH AMERICA: Ecuador to Chile (Dall, 1909; Carcelles & Williamson, 1951).

***Mitra fultoni* E. A. Smith, 1892**

(Pl. 318)

Range—San Diego, California, to the west coast of the Gulf of California and Cocos Island.

Remarks—The species is closely related to the more common, northern *M. idae*, is rather similar in form and colour, but differs primarily in sculpture, which is distinctly finer. The spiral grooves are less numerous, the longitudinal striae are weaker, and the pits are deeper, wider spaced, more regularly arranged and almost longitudinally aligned and persist to the base of the shell. Occasional specimens have a few, slightly risen spiral striae, the aperture, columellar folds and parietal callus are white or bluish-white and the parietal wall is flushed with brown. *M. fultoni* is a rare species with an appreciably more southerly distribution than *M. idae* Melvill, but with a distributional overlap between San Diego and Cedros Island. The species lives as far south as Cocos Island opposite the central American coast, but does not co-exist with *Mitra orientalis*. A detailed account of the species with distributional ranges and excellent figures, may be found in Sphon (1961).

Habitat—Intertidal and sublittoral, to a depth of 50 fathoms.

Measurements (mm)—

length	width	height of aperture	
44.0	15.0	22.6	Point Abreojos, Mexico
41.8	14.6	22.8	Point Abreojos, Mexico
39.4	14.0	21.4	Lectotype of <i>fultoni</i>
35.5	13.7	20.8	Syntype of <i>fultoni</i>

Synonymy—

1892 *Mitra fultoni* E. A. Smith, Annals & Mag. Nat. History, ser. 6, vol. 9, p. 255, textfig. (Point Abreojos, Lower California); 1905 Williamson, Bull. Sth. California Acad. Sci., vol. 4, p. 123; 1906, Proc. Biol. Soc. Washington, vol. 19, p. 197,

textfig. 6; 1931 Grant & Gale, Mem. San Diego Soc. Nat. History, vol. 1, p. 636; 1945 Burch, Min. Conch. Club Sth. California, no. 49, p. 32; 1959 Kanakoff & Emerson, Los Angeles County Mus. Contrib. Science, no. 31, p. 28; 1961 Sphon, Veliger, vol. 4, p. 32, pl. 7, figs. 1-3; 1962 Dushane, Veliger, vol. 5, p. 48.

1971 *Mitra (Atrimitra) fultoni* E. A. Smith, Keen, Sea shells trop. W. America, ed. 2, p. 639, fig. 1420 (figured "holotype" = lectotype).

Types—There are 2 syntypes of *M. fultoni* in the British Museum (NH) no. 1892.2.2.38-39, but the holotype has not been marked as such by Smith, nor has it been designated by him in the original publication. The larger specimen, B.M. (NH) no. 1892.2.2.38, length 39.4 mm, which is the specimen figured by Keen (1971) as the "holotype", is here designated as the lectotype of *M. fultoni*. The type locality is Point Abreojos, Baja California, Mexico.

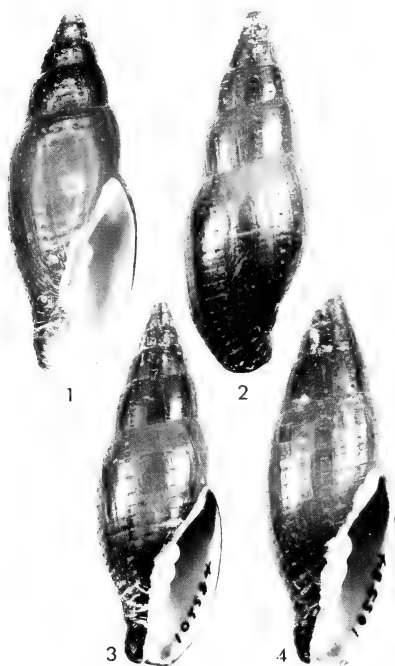


Plate 318. *Mitra (Mitra) fultoni* E. A. Smith.

Fig. 1. Lectotype from Point Abreojos, Lower California (BM (NH) 1892.2.2.38; 39.4 x 14.0 mm).

Figs. 2-4. Topotype specimens from Point Abreojos, Lower California (USNM 105584; figs. 2, 3 = 41.8 x 14.8 mm; fig. 4 = 44.0 x 15.0 mm).

Records—CALIFORNIA: San Diego (Burch, 1945). BAJA CALIFORNIA, MEXICO: San Martin Island; San Bartholome Bay; Whale Rock near Point Abreojos (all Sphon, 1961); Point Abreojos (USNM; ANSP; AMNH); Magdalena Bay; Santa Inez Bay, 35 faths. (Sphon, 1961); Ballenas lagoon, 6 faths. (USNM); off Punta Final, near San Luis Gonzaga Bay, 35 faths. (Sphon, 1961); Puertecitos (Sphon, 1961; Dushane 1962).

Fossil records—PLEISTOCENE: near Santa Monica (Grant & Gale, 1931); Newport Bay, Orange County (Kanakoff & Emerson, 1959); Fotrero Canyon, Los Angeles County; Lincoln Avenue deposits, Playa del Rey, Los Angeles County (Sphon, 1961).

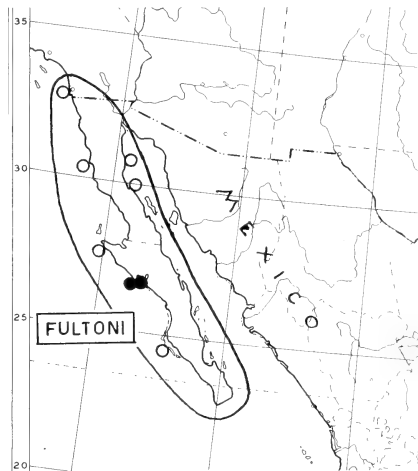


Plate 319. Geographical distribution of *Mitra (Mitra) fultoni* E. A. Smith.

Mitra caliginosa Reeve, 1844

(Pl. 315, figs. 7, 8)

Range—Unknown; probably west coast of America.

Remarks—The origin of the species remains a mystery, but judging from shell characters and periostracum, the species appears to be closely related to the species *M. orientalis* Griffith & Pidgeon. The description is based on the unique holotype and no other specimens have been seen in museums.

Habitat—Unknown.

Description—Shell up to 35 mm (about 1½ inches) in length, elongate-ovate and solid, sutures distinct and irregular. Whorls number 7 apart from protoconch which is missing, spire whorls regularly convex; sculptured with smooth, fine spiral grooves which number 8 on the penultimate and 15 on the body whorl in addition to 7

oblique cords towards the base. The spiral grooves give rise to 3-4 slightly elevated spiral threads near the suture of the last whorl; very fine longitudinal striae cross whorls. Aperture narrow, longer than the spire, not widening anteriorly, smooth within; outer lip moderately thickened and simple, columella calloused, parietal wall with a slightly thicker callosity, columella with 5 strong, oblique folds; siphonal fasciole straight, siphonal notch prominent. Creamy-white to fawn under a blackish-brown periostracum, aperture and columella bluish-white.

Measurements (mm)—

length	width	height of aperture	
34.9	12.4	20.0	Holotype of <i>caliginosa</i>

Synonymy—

1844 *Mitra caliginosa* Reeve, *Conchologia Iconica*, vol. 2, pl. 16, fig. 121 (no locality given); 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 5, pl. 6, fig. 75; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 120, pl. 35, fig. 61.

Types—The holotype of *M. caliginosa* is in the British Museum (NH) no. 1966718.

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

Mediterranean—East Atlantic *Mitra**Mitra fusiformis*subspecies *fusiformis* (Brocchi, 1814)

(Pl. 320; figs. 1-3)

Range—Miocene and Pliocene of Europe.

Remarks—The species is widely distributed throughout western Europe and has been recorded from Portugal, France, Italy, Austria, Hungary, Poland, England, Morea and the Isle of Rhodes. *M. fusiformis* is the ancestor of the Recent *M. fusiformis zonata* Marryat, which differs from the fossil species purely in colour. Some specimens of *M. fusiformis* from Upper Pliocene deposits of Asti, Italy, however, show the dark band on the body whorl. Hoernes & Auinger (1880) commented on the difficulty in separating *M. fusiformis* from its nearest fossil relatives, and as in Recent Mitridae, *M. fusiformis* produces broad and slender forms; the authors suspected that sexual dimorphism may be responsible for the variations in obesity. The species will reach a length of 100 mm (4 inches), and in juvenile specimens there is a distinct spiral sculpture, similarly to the American *Fusimitra* group, which tends to disappear with maturity and senility. Bellardi described numerous new species, many of them based on developmental stages and broad and slender forms of *M. fusiformis*.

Synonymy—

1814 *Voluta fusiformis* Brocchi, *Conch. foss. Subapp.*, vol. 2, p. 315 (Piemonte and Piacentino, Italy, Pliocene; lectotype in Museo Civico di Storia Naturale, Milan: 67.5 x 19.0 x 32.4 mm); 1954 Ronchetti, *Riv. Ital. Paleont.*, vol. 60, p. 250 (figured lectotype).

1820 *Mitra fusiformis* Brocchi, *Borson, Mem. R. Accad. Sci. Torino*, vol. 25, p. 207; 1826 Risso, *Hist. nat. L'Europe mérid.*, p. 243; 1835 Deshayes, *Exped. scient. Morée, Zool.*, p. 201, pl. 24, figs. 32, 33 (Morea); 1856 Höernes, *Abh. k. k. geol. Reichs-Anst. Wien*, vol. 3, p. 98, pl. 10, figs. 4-7 (Vienna Basin, Austria, Miocene); 1872 S. V. Wood, *Palaeont. Soc. England Mon.*, vol. 25, p. 8, pl. 5, figs. 3a, b (Red Crag, Walsingham, England; Pliocene); 1880 Hoernes & Auinger, *Abh. k. k. geol. Reichs-Anst. Wien*, vol. 12, p. 75, pl. 8, figs. 25-29; 1887 Bellardi, *Mem. R. Accad. Sci. Torino*, vol. 38, p. 23, pl. 1, fig. 21.

1847 *Mitra fusiformis* var. *aquitana* Grateloup, *Conch. foss. Terr. Tert. Adour, Atlas*, pl. 1, fig. 5 (Dax; St. Paul; Cabonnes, France; Miocene).

1847 *Mitra fusiformis* var. *italica* Grateloup, *ibid.*, pl. 1, fig. 6 (Dax; St. Paul; Cabonnes; Mainot, France; Miocene).

1847 *Mitra fusiformis* var. *elegans* Grateloup, *ibid.*, pl. 1, fig. 7 (Dax; St. Paul; Cabonnes; Mainot, France; Miocene) [non *M. elegans* Lea, 1840; nec Reeve, 1845].

1880 *Mitra venayssiana* Fontannes, *Moll. plioc. vall. Rhone & Roussillon*, vol. 2, p. 79, pl. 6, figs. 1a, b (St. Ariès, Vaucluse, France; Pliocene).

1904 *Mitra fusiformis* var. *parvobrevis* Sacco, *Moll. Terr. Tert. Piemonte*, pt. 30, p. 81, pl. 18, fig. 14 (Asti, Italy; Pliocene).

1904 *Mitra fusiformis* var. *subangulosa* Sacco, *ibid.*, p. 81, pl. 18, figs. 15, 16 (Piemonte, Italy; Pliocene).

1928 *Mitra gallica* Peyrot, *Act. Soc. Linn. Bordeaux, Suppl.*, vol. 79, p. 97, pl. 9, figs. 51, 52 (Saubrigues, France, Miocene; 49 x 17 mm).

*Mitra fusiformis*subspecies *zonata* Marryat, 1818

(Color pl. 255, fig. 9; pl. 320, figs. 4, 5)

Range—Adriatic and Mediterranean Seas to Cap Blanc, N.W. Africa.

Remarks—This large *Mitra* species most probably evolved from the Eocene *M. elongata* Lamarck, and the direct ancestral form *M.*

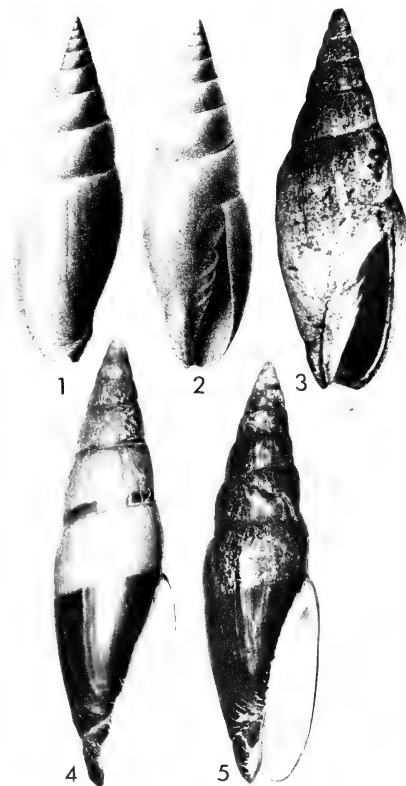


Plate 320. Figs. 1-3. *Mitra (Mitra) fusiformis fusiformis* (Brocchi) Figs. 4, 5. *M. (M.) fusiformis zonata* Marryat.

Figs. 1, 2. *M. fusiformis fusiformis* (Brocchi) from the Vienna Basin, Miocene of Austria (from Höernes, 1856, pl. 10, figs. 4a, b; 70.0 x 22.0 mm).

Fig. 3. Type figure of *M. gallica* Peyrot from Saubrigues, Miocene of France (from Peyrot, 1928, pl. 9, fig. 51; 49.0 x 17.0 mm).

Figs. 4, 5. *M. fusiformis zonata* Marryat from Villefranche-sur-mer, France (fig. 4 = IRSN, 80.2 mm; fig. 5 = NMW, 70.7 mm).

fusiformis. Odhner (1931) suspected that the Recent *zonata* is closely allied to the Mio-Pliocene *fusiformis*, and that differences in shape and characters of convex and subangulate whorls may be due to individual variation rather than biological speciation. The only differences between the fossil *fusiformis* and the living *zonata* are those of colour of the shell and separation in time. In some specimens of *fusiformis* from the Pliocene of Asti, the dark colouring on the body whorl is still distinguishable.

Habitat—Littoral and sublittoral, among rocks and on a mud substratum, to a depth of 66 fathoms.

Description—Shell up to 100 mm (4 inches) in length, fusiformly-ovate, sutures distinct; whorls 8-9 apart from protoconch, spire whorls weakly and regularly convex, sometimes weakly shouldered at sutures, smooth apart from longitudinal growth-striae. Aperture slightly shorter than the spire, narrow and elongate, smooth within, outer lip moderately thickened and simple; columella prominently calloused in adult specimens and with 4-6 oblique folds, siphonal fasciole straight, siphonal notch distinct. The light-coloured, creamy-brown shell is covered by a horny, dark brown periostracum which is ornamented by broad, marbled golden-brown transverse bands; on the spire whorls, the dark brown bands are very narrow but on the body whorl the golden-brown, marbled zone adjacent to the suture is narrow. Uniformly dark brown specimens with the pale zone obsolete or absent, have been recorded from the Adriatic and the Canary Islands. The aperture is white or bluish-white, the columellar folds are white and the parietal wall may be flushed with brown.

Measurements (mm)—

length	width	height of aperture	
90.0	20.0	—	Type of <i>antiquata</i>
80.2	21.5	37.2	Villefranche-sur-mer, France
70.0	20.0	—	Type of <i>santangelii</i>
29.0	10.0	—	Type of <i>minor</i> Pallary

Synonymy—

1818 *Mitra zonata* Marryat, Trans. Linn. Soc. London, vol. 12, pt. 2, p. 338, pl. 10, figs. 1, 2 (Port of Nice, France, adhering to a sounding lead in very deep water) Paper was read in 1817; 1820 Swainson, Zoological Illustrations, ser. 1, vol. 1, pl. 3, 2 figs.; 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 107, pl. 33, fig. 108; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 3, fig. 17; 1852 Petit de la Saus-saye, Journal de Conchyliologie, vol. 2, p. 202; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 4, pl. 5, fig. 62; 1882 Tryon, Manual of Conchology, vol. 4, p. 130, pl. 38, figs. 122, 126; 1884 Fischer, Journal de Conchyliologie, vol. 32, p. 99; 1901 Vayssière, Journal de Conchyliologie, vol. 49, p. 77,

- pl. 3, figs. 1-5 (anatomy); 1931 Odhner, Arkiv Zoologie, vol. 23A, no. 1r, p. 20, pl. 1, fig. 14; 1957 Mars, Vie et Milieu, vol. 8, p. 110; 1964 Ghisotti, Journal de Conchyliologie, vol. 104, p. 48, pl. 5, figs. 1, 2.
1828 *Voluta zonata* Wood, Index Testaceologicus Suppl., p. 10, pl. 3, fig. 13b.
1840 *Mitra santangelii* Maravigna, Magas. Zool. Guérin, pl. 23 (no locality given; according to Kobelt, 1901 = Bay of Ognina, Catania) [worn specimen].
1874 *Mitra antiquata* ["Monteroso"], Kobelt, Jahrb. Malak. Gesellschaft, vol. 1, p. 227, figs. 3, 4 (Oran, Algeria, 50-60 m).
1900 *Mitra zonata* var. *major* Pallary, Journal de Conchyliologie, vol. 48, p. 262 (Oran, Algeria) [refers to Kobelt, 1874, pl. 11, fig. 3] (non Grateloup, 1847).
1900 *Mitra zonata* var. *minor* Pallary, *ibid.*, p. 262, pl. 6, fig. 15 (Oran, Algeria) [non Weinkauff, 1868, nec Sowerby, 1874].
1900 *Mitra zonata* var. *protracta* Pallary, *ibid.*, p. 262 (Oran, Algeria) [non Bellardi, 1887].
1934 *Mitra (Episcomitra) zonata concolor* Coen, Biol. Mar. Rovigno Ven., vol. 15, p. 5, fig. 1 (Adriatic; as *M. zonata* on plate explanations [non Bucquoy, Dautzenberg & Dollfus, 1883]).
1963 *Mitra (Chrysame) zonata* Marrat (*sic*), Shikama, Select. shells world colours, vol. 1, pl. 74, fig. 15 (worn specimen).
1967 *Mitra (Episcomitra) zonata* Marryat (*sic*), Zavadnik, Zoologischer Anzeiger, vol. 178, p. 389, figs. 1-3 (shell, animal & egg-capsule); 1968 Angeletti, Conchiglie da collezione, no. 17, p. 58, fig. 99.
1968 *Mitra (Swainsonia) zonata* Marryat, Nordsieck, Die europ. Meeres-Gehäuseschnecken, p. 150, pl. 24, fig. 84.70.
1970 *Mitra fusiformis zonata* Marryat, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 34, pl. 2, fig. 1, textfigs. 1, 27.
1970 *Mitra zonata* var. *incurvata* Parenzan, Carta d'identita delle conchiglie del Medit., vol. 1, p. 193, pl. 40, fig. 770 [nomen nudum].

Types—The whereabouts of the type-specimen of *M. zonata* is unknown.

Records—ADRIATIC SEA: Hvar; Split; Rovinj; Cavtat; Makarska; Solta; W. of Figarola Island, 30 m, all Yugoslavia (Zavadnik, 1967). MEDITERRANEAN SEA: ITALY: Bay of Ognina, Catania (Kobelt, 1901); Sardinia; Livorno; Naples (DMNH); Sicily (Vayssière, 1901); Capri; Palermo (Ghisotti, 1964). FRANCE: Villefranche-sur-mer (IRSN: NMW); Toulon (Petit, 1852); Marseilles; Monaco; St. Raphael; St. Jean (Ghisotti, 1964). SPAIN: S.W. of Masina Island, Cap Creuse region (Mars, 1957); Mataro near Barcelona; Villajoyosa near Alicante; Malaga (Ghisotti, 1964). NORTH AFRICA: Gulf of Oran, Algiers, 60 m (MCZ). EAST ATLANTIC: La Luz, Canary Islands (Odhner, 1931); Cap Blanc, Mauritania, W. Africa (Fischer, 1884; Odhner, 1931).

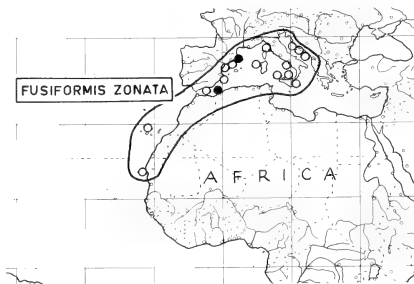


Plate 321. Geographical distribution of *Mitra (Mitra) fusiformis zonata* Marryat.

Mitra cornicula Linnaeus, 1758

(Pl. 322)

Range—Throughout the Mediterranean and Adriatic Seas to the Canary and Cape Verde Islands.

Remarks—Usually the more common and variable a species is, the more names it will receive, and *M. cornicula* is no exception with a total of 25 synonyms; these synonyms are of living populations and do not include forms from Pliocene deposits of Europe. In view of the rather extensive synonymy, only the more pertinent literature citations are listed. There is a considerable distributional overlap between *M. cornicula* and *M. nigra*, and also an intergradation of shell characters which make the validity of *M. nigra* as a bio-species suspect. A short summary of the various forms of *cornicula* is as follows:

schroeteri form: this is the slender, fusiform, pale and banded form, which has also been described as *M. cornicularis* Lamarck.

lactea form: usually applied to albino or pale forms of *M. cornicula*, the shell is also slender and fusiform and may occur in a uniformly brown colour; the fine spiral grooves usually become obsolete on the last 3 whorls.

lutescens form: this form is intermediate in shape between the slender *lactea* form and typical *cornicula*. Numerous intergrading individuals connect the broad, dark brown form to the more slender, banded or pale forms of *M. cornicula*.

cornicula: the typical form is broad and uniformly horny-brown in colour.

Habitat—In sponges, sand and shingle, among weed and under rocks, from the intertidal region to a depth of 120 fathoms.

Description—Shell up to 40 mm (about 1½ inches) in length, ovate to fusiformly-elongate, moderately solid or light in weight. Whorls 6-7, apart from the protoconch, sutures distinct but not canaliculate, spire whorls regularly convex, post-nuclear whorls sometimes clathrate, corded or with pitted spiral grooves, sculpture becoming occasionally obsolete on the last 3 whorls; whenever a sculpture is present, the penultimate whorl has 5-25 spirals, and the grooves are either smooth or minutely pitted by descending, macroscopic axial hair-lines. Aperture slightly shorter or longer than the spire, moderately narrow and smooth within; outer lip moderately thickened, and simple. Columella calloused, parietal wall occasionally thinned, callus more prominent anteriorly, columella with 3-5 oblique folds; siphonal canal straight and obliquely corded,

siphonal notch distinct but shallow. Variable in colour, uniformly horny-brown or light brown, occasionally very pale and sometimes indistinctly banded on the body whorl; aperture brown or bluish-brown, columella frequently brown on the parietal wall, columellar folds white or flushed with brown. The periostracum is thin and opaque and brown or greyish-brown in colour.

Measurements (mm)—

length	width	height of aperture	
31.2	11.0	15.6	Lectotype of <i>lactea</i>
27.4	12.0	15.6	Lectotype of <i>cornea</i>
27.2	8.9	13.6	Sousse, Tunisia
23.8	10.3	13.0	Fogo I., Cape Verde I.
21.3	7.5	10.9	Holotype of <i>cornicularis</i>

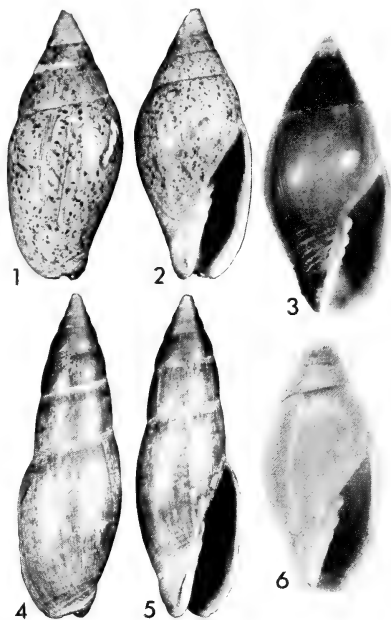


Plate 322. *Mitra (Mitra) cornicula* (Linnaeus).

Figs. 1, 2. Specimen from Palermo, Sicily, Italy; broad form (WABP coll.; 15.0 x 6.6 mm).

Fig. 3. Specimen from Las Palmas, Canary Ids. (WOC coll.; 26.0 x 12.2 mm).

Figs. 4, 5. Specimen from off Sousse, Tunisia, N. Africa; slender form (WOC coll.; 27.2 x 9.0 mm).

Fig. 6. Holotype of *M. nitida* A. Adams; worn specimen (BM (NH) 1967817; 10.1 x 4.8 mm).

20.5	7.8	10.0	Lectotype of <i>lutescens</i>
16.1	7.0	8.6	Lectotype of <i>cornicula</i>
14.4	6.2	7.9	Lectotype of <i>graja</i>
12.8	5.9	7.4	Palermo, Sicily
10.1	4.8	6.6	Holotype of <i>nitida</i>

Synonymy—

- 1758 *Voluta cornicula* Linnaeus, Systema Naturae, ed. 10, p. 731 (refers to Gualtieri, pl. 43, fig. N) [Mediterranean Sea]; 1969 Cernohorsky, Journ. Linn. Soc. London, Zoology, vol. 48, p. 352, pl. 1, fig. A (figured lectotype).
 1791 *Voluta laevigata* Gmelin, Systema Naturae, ed. 13, p. 3455 (refers to Chemnitz, vol. 4, pl. 150, fig. 1408) [no locality given; according to Chemnitz = Mediterranean and West Indies].
 1801 *Mitra laevigata* Bosc, Hist. Nat. Coquille, vol. 5, p. 53.
 1807 *Voluta schroeteri* Link, Besch. Nat.-Samm. Univ. Rostock, p. 128 (refers to Schröter, Einleitung, vol. 1, pl. 1, fig. 13 and Chemnitz, vol. 11, pl. 179, figs. 1733, 1734) [no locality given; according to Schroter = Guinea].
 1811 *Mitra lactea* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 210 (Probably African Ocean); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 28, pl. 10, fig. 30; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 969, pl. 3, fig. 23 (figured lectotype).
 1818 *Mitra lutescens* Lamarck, *ibid.*, p. 210 (Coasts of W. Africa); 1838 Kiener, *ibid.*, p. 31, pl. 11, fig. 32; 1969 Cernohorsky, *ibid.*, p. 970, pl. 3, fig. 26 (figured lectotype).
 1811 *Mitra cornea* Lamarck, *ibid.*, p. 211 (Coasts of W. Africa); 1867 Troschel, Gebiss der Schnecken, vol. 2, pl. 6, fig. 5 (radula); 1969 Cernohorsky, *ibid.*, p. 972, pl. 4, fig. 28 (figured lectotype).
 1822 *Mitra cornicularis* Lamarck, Hist. nat. anim. s. vertebres, vol. 7, p. 312 (Coasts of W. Africa); 1838 Kiener, *ibid.*, p. 32, pl. 12, fig. 38; 1969 Cernohorsky, *ibid.*, p. 970, pl. 3, fig. 24 (figured lectotype).
 1826 *Turbinella glabra* Risso, Hist. nat. L'Europe mérid., vol. 4, p. 213, pl. 12, fig. 112 (fossil à la Trinité) [non *Mitra glabra* Swainson, 1821].
 1826 *Mitra nitens* Risso, *ibid.*, p. 241 (Régions des Algues; syntypes 12.0 and 13.0 mm).
 1826 *Mitra glabra* Risso, *ibid.*, p. 241 (Régions des Algues; syntypes 18.0 and 19.5 mm) [non *M. glabra* Swainson, 1821].
 1826 *Mitra inflata* Risso, *ibid.*, p. 242 (Régions coralligènes. App. Printemps; syntypes 16.0, 16.0, 18.0 and 22.0 mm).
 1826 *Mitra media* Risso, *ibid.*, p. 242 (Régions coralligènes. App. Printemps; type 11.0 mm).
 1826 *Mitra buccinoidea* Risso, *ibid.*, p. 245, pl. 10, fig. 142 (Régions des Algues. App. Hiver, printemps; type 11.0 mm).
 1829 *Mitra nitens* Blainville, Faun. Française Hist. Nat., p. 215, pl. 8A, figs. 1, 1a and pl. 8B, fig. 2 (Coast of Corsica).
 1829 *Mitra corniculata* Blainville, *ibid.*, p. 219; 1886 Locard, Cat. gén. moll. France, vol. 2, pp. 106, 541 (invalid emendation).
 1843 *Mitra philippiana* Forbes, Brit. Assoc. Adv. Sci. Reports, p. 191 (Milo, Cerigo, Aegean Sea; type 10.6 x 5.3 mm).
 1844 *Mitra plumbea* Lamarck, Reeve, Conchologia Iconica, vol. 2, pl. 20, fig. 156 (non Lamarck, 1811).
 1844 *Mitra lutescente* (sic) Deshayes in Deshayes & Milne-Edwards, Hist. nat. anim. s. vertebres, ed. 2, vol. 10, p. 323.
 1845 *Mitra graja* Reeve, Conchologia Iconica, vol. 2, pl. 39, fig. 327 (Island of Paros, Grecian Archipelago).
 1853 *Mitra nitida* A. Adams, Proc. Zool. Soc. London for 1851, p. 134 (no locality given).
 1868 *Mitra cornea* var. minor Weinkauff, Conchyl. Mittelmeeres, vol. 2, p. 30 (Mediterranean).
 1874 *Mitra simplex* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 24, fig. 528 (no locality given) [non Dunker, 1846].
 1874 *Mitra insolata* Sowerby, *ibid.*, p. 7, pl. 28, fig. 650 (no locality given).
 1886 *Mitra obtusa* Locard, Cat. gén. moll. France, pp. 107, 541

- (Le Roussillon, Mediterranean; types 24.0, 26.0 mm x 9.0 – 10.0 mm).
 1890 *Mitra aquitanica* Locard, L'Echange, Rev. Linn., vol. 6, no. 62, p. 110 (Coasts of France; syntypes 34.0 and 31.0 mm) [non Grateloup, 1847].
 1900 *Mitra (Fuscomitra) lutescens* Lamarck, Pallary, Journal de Conchyliologie, vol. 48, p. 263.
 1901 *Mitra cornicula* var. *brusinae* Kobelt, Icon. europ. Meeresconchylien, vol. 2, p. 52, pl. 42, figs. 13, 14 (South Dalmatia) [non Hoernes & Auinger, 1880].
 1903 *Mitra cornicula* var. *glandina* Monterosato, Ann. Mus. d'Hist. Nat. Marseille, vol. 8, no. 1, p. 8, pl. 1, fig. 19 (Gulf of Gabès and Alexandria; type 25.0 x 8.25 mm).
 1936 *Mitra fusca* Swainson, Cox, Mem. Not. Mus. Min. Geol. Univ. Coimbra, no. 9, p. 21, pl. 2, figs. 5a, b (Pliocene of Portugal) [non Swainson, 1824].
 1960 *Mitraria cornicula* Linne, Glibert, Mém. Inst. Roy. Sci. Nat. Belg., ser. 2, fasc. 61, p. 40.
 1968 *Mitra (Fuscomitra) cornicula* (Linne), Nordsieck, Die europ. Meeres-Gehäuseschnecken, p. 149, pl. 24, fig. 84.51. (with var. *lactea* and *schröeteri*).
 1968 *Mitra (Fuscomitra) cornicula cornea* Lamarck, Nordsieck, *ibid.*, p. 149, pl. 24, fig. 84.52.

Types—The following types are in the Museum d'Histoire Naturelle, Geneva: the lectotype of *M. lactea* Lamarck, no. 1102/62/1; the holotype of *M. cornicularis* Lamarck, no. 1102/63; the lectotype of *M. lutescens* Lamarck, no. 1107/97 and *M. cornea* Lamarck, no. 1102/66/1. The lectotype of *M. cornicula* (Linnaeus) is in the Linnean Society, London, and the lectotype of *M. graja* Reeve, B.M. (NH) no. 1967773 (here designated), and the holotype of *M. nitida* A. Adams, B.M. (NH) no. 1967817, are in the British Museum (NH). The type-specimens of species described by Risso and Locard, are in the Museum National d'Histoire Naturelle, Paris. The type locality is Mediterranean Sea.

Records—LEBANON: Beirut (USNM; Steiner coll.). ISRAEL: Tel Aviv (USNM). CRETE: off Crete, 70-120 faths. (USNM). YUGOSLAVIA: Dalmatia (USNM). ITALY: Sicily

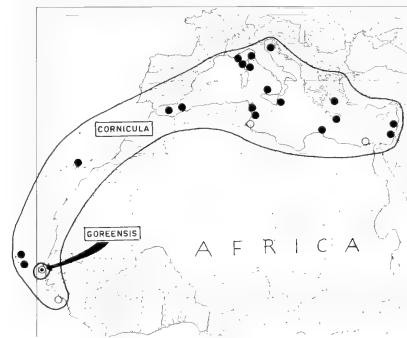


Plate 323. Geographical distribution of the species *Mitra* (*Mitra*) *cornicula* (Linnaeus) and *M. (M.) gorensis* Melvill.

(USNM); Palermo, Sicily (Powell coll.); Livorno; Corsica (both USNM). FRANCE: Cannes (USNM); LIBYA: off Derna, 28 faths. (USNM). TUNIS: Nares, 50-100 faths. (USNM); off Sousse (Cernohorsky coll.). ALGERIA: Oran (Cernohorsky coll.). MOROCCO: Melilla (DMNH Clover coll.). CANARY ISLANDS: Las Palmas (AIM); Medano, Tenerife; Lanzarote (both DMNH). CAPE VERDE ISLANDS: Fogo Island (Cernohorsky coll.); Branco Isle, 25 m (IRSN).

Fossil records—PLIOCENE: Mina, near Sao Pedro, Portugal (Cox, 1936—for *Mitra fusca* = *cornicula*). PLEISTOCENE: Messina; Milazzo; Montepellegrino, all Sicily (Glibert, 1960).

Mitra goreensis Melvill, 1925

(Pl. 323A)

Range—Senegal, West Africa.

Remarks—The author compared his species with the Polynesian *M. testacea* Broderip and the Australian *M. rhodia* Reeve (= *carbonaria* Swainson), but failed to compare the species with *M. cornicula* (Linnaeus) which it very closely resembles. The penultimate and upper part of the body whorl are darker brown than the remainder of the whorls, but in some individuals of *M. cornicula* the lower half of the body whorl is also paler. *M. goreensis* has the early spire whorls finely clathrate, the penultimate whorl has 14 fine spiral threads and the body whorl 33 plus 9 cords towards the base. The holotype has 7 whorls with part of the protoconch missing, a smooth aperture and 5 columellar folds (not 3 as given by Melvill). The shell is dark chestnut-brown, paling towards the spire and lighter in colour on the anterior half of the body whorl, and the interior of the aperture is greyish-brown. The species has not been reported since the date of description; it may prove to be only a colour variant of the variable *M. cornicula* (Linnaeus).



Plate 323A. *Mitra (Mitra) goreensis* Melvill. Holotype from Gorée Id., Senegal, West Africa (BM (NH) 196581; 13.2 x 4.6 mm) [photo courtesy J. Taylor, BM (NH)].

Measurements (mm)—

length	width	height of aperture	
13.2	4.6	7.0	Holotype of <i>goreensis</i>

Synonymy—

1925 *Mitra goreensis* Melvill, Proc. Malac. Soc. London, vol. 16, p. 216, pl. 10, fig. 6 (Gorée Island, Senegal, West Africa).

Types—The holotype of *M. goreensis* is in the British Museum (NH) no. 196581. The type locality is Gorée Island, Senegal, West Africa.

Mitra nigra (Gmelin, 1791)

(Pl. 323B)

Range—Bay of Biscay to the Azores, Canary Islands and Angola, West Africa.

Remarks—Having examined various populations of *M. cornicula* and *M. nigra*, we suspect that *M. nigra* is the East Atlantic form of the Mediterranean-Adriatic *M. cornicula*. Although large, inflated specimens, with the typical blackish-brown exterior colouring and bluish-

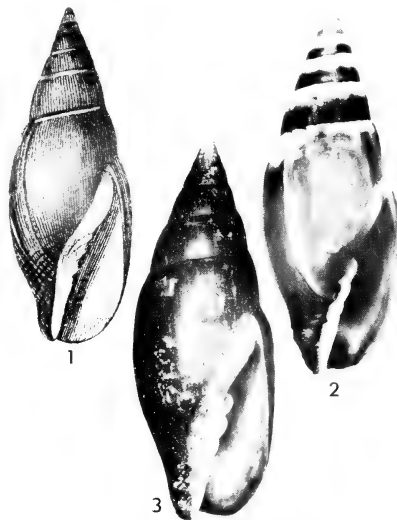


Plate 323B. *Mitra (Mitra) nigra* (Gmelin).

Fig. 1. Lectotype figure of *Voluta nigra* Gmelin, from Guinea, West Africa (from Chemnitz, 1788, pl. 151, fig. 1430).

Fig. 2. Lectotype of *M. pigra* A. Adams (BM (NH) 1967840; 38.8 x 14.7 mm).

Fig. 3. Specimen from West Africa (BM (NH); 38.4 mm).

white aperture and columellar folds, are easily separated from the smaller, horny-brown *M. cornicula*, there are numerous individuals from the Canary Islands, Madeira and Cape Verde Islands which are intermediate in characters between *M. cornicula* and *M. nigra*, and specimens from the same lot could be assigned to either species. Fischer (1942) pointed out that *M. nigra* is similar to *M. cornicula*, but that the former species has 1 more columellar fold; we found the normal fluctuations of ± 3 folds in both species. *M. nigra* has also been reported from the South of France by Monterosato (1877) and from Algeria by Pallary (1900); these records may have been based on larger examples of *M. cornicula*.

In its typical form the shell is larger than *M. cornicula*, the sutures are slightly ledged, the whorls more inflated particularly at the body whorl, and the sculpture consists of few or numerous, fine and sometimes uncountable spiral striae and macroscopic axial hair-lines. The colour is light tan to brown, overlaid by a dark brown to blackish-brown periostracum, and some individuals may have a pale band at the sutures; the aperture is bluish-white, bluish-brown or purplish-violet and the columellar folds are white or violet. The largest specimen seen measured 46.0 mm in length.

Habitat—Intertidal and sublittoral, under stones.

Measurements (mm)—

length	width	height of aperture	
38.8	14.7	21.2	Lectotype of <i>pigra</i>
31.0	11.2	18.0	W. of Conakry, W. Africa
28.0	10.0	14.8	Rio Muni, W. Africa
26.0	12.2	15.6	Las Palmas, Canary I.

Synonymy—

- 1757 "*Le Gousol*" Adanson, Hist. Nat. Senegal, Coquillages, p. 134, pl. 9, fig. 26 (*non binomial*).
 1788 "*Voluta nigra*" Chemnitz, Syst. Conchylien-Cabinet, vol. 10, p. 168, pl. 151, figs. 1430, 1431 (*non binomial*).
 1791 *Voluta nigra* Gmelin, Systema Naturae, ed. 13, p. 3452 (refers to Chemnitz, *op. cit.*, figs. 1430, 1431) [Guinea; India; Greenland;—last 2 localities erroneous].
 1798 *Mitra castanea* Röding, Museum Boltenianum, p. 137 (refers to Chemnitz, *op. cit.*, figs. 1430, 1431) [no locality given].
 1807 *Mitra nigra* Gmelin, Fischer, Museum Demidoff, vol. 3, p. 170; 1969 Duffus, Proc. Malac. Soc. London, vol. 38, p. 344; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 66, pl. 1, figs. 7, 10.
 1811 *Mitra melaniana* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 212 (refers to Chemnitz, *op. cit.*, figs. 1340, 1341) [Coasts of Guinea and India;—last locality erroneous; 46–47 mm].
 1844 *Mitra fusca* Reeve, Conchologia Iconica, vol. 2, pl. 15, fig. 110; 1867 Troschel, Gebiss der Schnecken, vol. 2, p. 68, pl. 6, fig. 6 (radula); 1868 Hogg, Trans. Roy. Microsc. Soc., vol. 16,

- pl. 10, fig. 37 (radula); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 16, fig. 301; 1877 Monterosato, Journal de Conchyliologie, vol. 25, p. 43; 1882 Tryon, Manual of Conchology, vol. 4, p. 122, pl. 36, fig. 75; 1912 Dautzenberg, Ann. L. Inst. Monaco, vol. 3, p. 28; 1922 Peile, Proc. Malac. Soc. London, vol. 15, p. 93; 1942 Fischer, Journal de Conchyliologie, vol. 85, p. 231, pl. 7, fig. 11; 1947 Nickles, Inst. Française d'Afrique Noire, p. 11; 1952, Journal de Conchyliologie, vol. 92, p. 148; 1956 Knudsen, Atlantide Report, no. 4, p. 69 (non *M. fusca* Swainson, 1824).
 1849 *Mitra adansonii* Philippi, Zeitschrift f. Malakozoologie, vol. 5, p. 155 (Gabon in Guinea; holotype c. 22.6 x 8.7 x 11.3).
 1853 *Mitra pigra* A. Adams, Proc. Zool. Soc. London, for 1853, p. 133 (Australia = error!); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 11, fig. 177 and pl. 17, fig. 325; 1882 Tryon, Manual of Conchology, vol. 4, p. 120, pl. 35, figs. 58, 60.
 1858 *Mitra loricea* Drouet, Mém. Soc. Acad. Sci. Lett. L'Aube, vol. 22, p. 35 (San Miguel and Pico, Azores; 35.0 x 13.0 mm).
 1900 *Mitra (Fuscomitra) fusca* (Swainson), Reeve, Pallary, Journal de Conchyliologie, vol. 48, p. 263; 1968 Nordsieck, Die europ. Meeres-Gehäuseschnecken, p. 149, pl. 24, fig. 84.50 (non *M. fusca* Swainson, 1824).
 1914 *Mitra adansonii* Phil. Tomlin & Shackelford, Journal de Conchyliologie, vol. 14, p. 245.
Types—Gmelin probably did not own a specimen and the existence of the type of *M. nigra* is unknown. The specimen figured in Chemnitz, on plate 151, figures 1430, 1431, is designated as the lectotype of *M. nigra* (Gmelin). The types of *M. castanea* Röding, and *M. melaniana* Lamarck, cannot be found, and the type-specimen of *M. adansonii* Philippi, is probably in the Zoological



Plate 323C. Geographical distribution of *Mitra (Mitra) nigra* (Gmelin)

Museum, Berlin. The lectotype, here designated, and 2 syntypes of *M. pigra* A. Adams, are in the British Museum (NH) no. 1967840.

Nomenclature—The species has a confused taxonomic history. Chemnitz (1788) first described the species and stated that he received his specimens from Guinea and Tranquebar, and later also from Greenland. From Tranquebar Chemnitz probably received the superficially similar *M. chinensis* Griffith & Pidgeon, and from Greenland *Volutomitra groenlandica* (Beck in Möller). We therefore restrict the type locality of *M. nigra* to Guinea, West Africa. The erroneous localities were repeated by Gmelin, and Lamarck for his *M. melaniana*. In 1824 Swainson described a *Mitra fusca* from the Indian Ocean, and subsequently (1831) illustrated the species and assigned it to the genus *Mitrella* (= *Swainsonia*). His species is the tropical Indo-Pacific *Scabricola* (*Swainsonia*) *zephyrina* (Sowerby, 1874); the species has been correctly illustrated by Kiener (1838). *Mitra fusca* has been erroneously figured by Reeve (1844) from Madeira (his figure represents *M. nigra*), and the taxon has been misinterpreted by all subsequent authors, and applied to the East Atlantic *M. nigra*.

Records—BAY OF BISCAY: (Fischer, 1942). AZORES: Horta Fayal (USNM). MADEIRA: (USNM; DMNH; IRSN). CANARY ISLANDS: Guia (USNM); Las Palmas (Powell coll.; Cernohorsky coll.). CAPE VERDE ISLANDS: (USNM; IRSN). FRENCH GUINEA: W. of Conakry, 9°23'N & 15°07'W, 30–34 m (ZMC). GOLD COAST: Teshi (Knudsen, 1956). RIO MUNI: (Clover coll.). SÃO THOME ISLANDS: (Tomlin & Shackleford, 1914). GABON: (BMNH); Libreville (IRSN); Port Gentil (Nicklès, 1952). ANGOLA: Mossamedes (Dautzenberg, 1912).

European Eocene—Oligocene *Mitra*

Mitra angystoma Deshayes, 1865, Desc. anim. s. vert. Bass. Paris, vol. 3, p. 569, pl. 103, figs. 26, 27 (Acy, Paris Basin, France, Eocene; 36 x 15 mm).

Mitra auversiensis Cossmann, 1889, Ann. Soc. Roy. Malac. Belg., vol. 24, p. 183, pl. 7, fig. 7 (Auvers, Paris Basin, France, Eocene; 11 x 4 mm).

Mitra cincta Roualt, 1850, Mem. Soc. géol. France, ser. 2, vol. 3, p. 498, pl. 18, figs. 10, 10a (Bos-d'Arros, Pau, Numulitique zone, France, Eocene; 35.0 x 10.5 mm).

Mitra crebricosta Lamarck, 1803, Ann. Mus. d'Hist. Nat. Paris, vol. 2, p. 58 (Grignon, Paris Basin, France, Eocene; 15.0 mm); *Mitra creb-*

ricostata (sic) Lamarck, Deshayes, 1835, Desc. coq. foss. envir. Bass. Paris, vol. 2, pl. 89, figs. 21, 22; Anton, 1839, Verz. Conchylien, p. 69; *Mitraria crebricostata* (sic) Lamarck, Glibért, 1960, Mem. Inst. Roy. Sci. Nat. Belg., vol. 61, p. 40. *M. crebricostata* of authors, is an invalid emendation.

Mitra delbosii Roualt, 1850, Mém. Soc. géol. France, ser. 2, vol. 3, p. 498, pl. 18, figs. 12, 12a (Bos-d'Arros, Pau, France, Eocene; 15 x 6 mm).

Mitra delucii Defrance in Blainville, 1824, Dict. Sci. Naturelles, vol. 31, p. 493 (refers to Tabl. Encycl. Méth., pl. 383, fig. 2; Parnes, Paris Basin, France, Eocene; 81.0 mm); Deshayes, 1835, Desc. coq. foss. envir. Bass. Paris, vol. 2, p. 665, pl. 89, fig. 9; Cossmann & Pissaro, 1901, Bull. Soc. géol. Normandie, vol. 20, p. 87, textfig. 1. *Voluta costellata* Bory St. Vincent, 1827, Explan. to Tabl. Encycl. Méth., pl. 383, fig. 2. *Mitra brongniarti* Deshayes, 1832, Encycl. Méth. Hist. Nat., ed. 2, p. 468 (Parnes; Liancourt; Mouchy-le-Châtel, France, Eocene; 85.0 mm). *Mitra brongnarti* (sic) Deshayes, 1835, Desc. coq. foss. envir. Bass. Paris, vol. 2, p. 665, pl. 89, figs. 9, 10.

Mitra elongata Lamarck, 1803, Ann. Mus. d'Hist. Nat. Paris, vol. 2, p. 60 (refers to d'Argenville, Fossiles, Buccinite, p. 29, 2e, fig. No. 6) [Montmirail en Brie, Paris Basin, France, Eocene; 55.0 mm]; Deshayes, 1835, Desc. coq. foss. envir. Bass. Paris, vol. 2, p. 665, pl. 89, figs. 7, 8; Cossmann, 1899, Ess. paléoc. comparée, vol. 3, p. 156, pl. 7, figs. 12, 13; Cossmann &

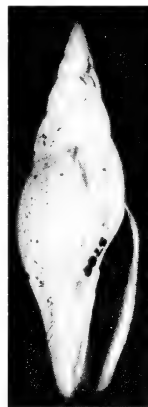


Plate 323D. *Mitra* (*Mitra*) *elongata* Lamarck. Paris Basin, Eocene of France (NZGS 5780; 55.5 mm).

- Pissaro, 1901, Bull. Soc. géol. Normandie, vol. 20, p. 87, pl. 10, fig. 8 *Mitra cryptoconopsis* de Gregorio, 1881, Faun. S. Giov. Hill., p. 85, pl. 7, fig. 45. Plate 323D.
- Mitra mettei* Giebel, 1864**, Abh. Naturf. Gesell. Halle, vol. 8, p. 15, pl. 1, fig. 13 (Lattorf, Germany, L. Oligocene); von Koenen, 1890, Abh. k. preuss. geol. Land., vol. 10, p. 533, pl. 37, figs. 11a, b and pl. 36, figs. 13a, b.
- Mitra postera* von Koenen, 1890**, Abh. k. preuss. geol. Land., vol. 10, p. 532, pl. 36, figs. 14a-c (Lattorf, Germany, L. Oligocene; 18.0 x 8.0 mm).
- Mitra regularis* "Schaur", Fuchs, 1870**, Denk. Akad. Math. Naturw. Wien, vol. 30, p. 47, pl. 8, figs. 33, 34 (Vincentian, Italy; M. Oligocene).
- Mitra turriculata* Schafhäütl, 1863**, Leth. Geog. Kressenberg, p. 209, pl. 52, fig. 5 (Kressenberg, Germany, Eocene) [non *M. turriculata* G. Fischer, 1807].
- European Miocene—Pliocene *Mitra***
- The following list contains 155 Tertiary species, the majority having been described by Bellardi. His so-called "species" are mostly individual, ecological and developmental forms of previously described and well-known species, such as *M. fusiformis* (Brocchi), *M. cornicula* (Linnaeus), *M. dujardini* Basterot, and *M. innognita* Basterot. The number of described immature and juvenile individuals of species is unusually high in Bellardi's work.
- Mitra abbreviata* Michelotti, 1847**, Nat. Verh. Holl. Maat. Haarlem, vol. 3, p. 309 (Tortone, Italy, Miocene; 23 x 10 mm).
- Mitra abscissa* Bellardi, 1887**, Mem. R. Accad. Sci. Torino, vol. 38, p. 25, pl. 1, fig. 22 (Villaveria-Fontanilis, Italy, U. Pliocene; 53 x 16 mm). Similar to *M. fusiformis* (Brocchi, 1814).
- Mitra absona* Bellardi, 1887, *ibid.***, p. 40, pl. 4, fig. 4 (Val Ceppi, Italy, M. Miocene; 12 x 4 mm).
- Mitra acuta* Bellardi, 1850**, Mem. R. Accad. Sci. Torino, ser. 2, vol. 11, p. 11, pl. 1, fig. 18 (Tortone, Italy, M. Miocene); 1887, Mem. R. Accad. Sci. Torino, vol. 38, p. 53, pl. 3, figs. 41a, b; Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *sulcatulatissima* p. 142 (as *sulcatulatissima* in 1904, p. 82, pl. 18, fig. 33); var. *toeniatomaculata*, p. 143 (as *taeniatomaculata* in 1904, p. 82, pl. 18, figs. 34-36), and var. *al-*
- botoeniata*, p. 143 (as *albotaeniata* in 1904, p. 82, pl. 18, figs. 37, 38) (non *M. albotaeniata* Hervier, 1897).
- Mitra addita* Bellardi, 1887, *ibid.***, p. 28, pl. 1, fig. 25 (Valle Andona, Italy, U. Pliocene; 58 x 18 mm); with var. *profundesulcata* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 140 (figd. in Sacco, 1904, p. 81, pl. 18, fig. 17). Similar to *M. fusiformis* (Brocchi). p. 140 (figd. in Sacco, 1904, p. 81, pl. 18, fig. 17). Similar to *M. fusiformis* (Brocchi).
- Mitra adlecta* Bellardi, 1887, *ibid.***, p. 26, pl. 3, fig. 10 (Valle Andona, Italy, U. Pliocene; 25 x 9 mm).
- Mitra adscripta* Bellardi, 1887, *ibid.***, p. 15, pl. 4, fig. 25 (Sant'Agata, Italy, U. Miocene; 38 x 15 mm).
- Mitra afficta* Bellardi, 1887, *ibid.***, p. 57, pl. 3, fig. 49 (Piemonte and Liguria, Italy, Miocene; 23 x 9 mm).
- Mitra agnata* Bellardi, 1887, *ibid.***, p. 31, pl. 1, fig. 29 (Albugnano, Italy, M. Miocene; 55 x 15 mm). Similar to juvenile *M. fusiformis* (Brocchi).
- Mitra albigonensis* Bellardi, 1887, *ibid.***, p. 33, pl. 1, fig. 32 and pl. 5, fig. 6 (Savona-Fornaci; Albenga-Torsero; Cortande, Italy, L. Pliocene; 60 x 18 mm); Sacco, 1890, Cat. Paleont. bac. terz. Piemonte, with var. *parvulobrevis*, p. 141 and *subinflatabrevis*, p. 141 (figd. by Bellardi, 1887, p. 5, fig. 6 and Sacco, 1904, pl. 18, fig. 24). Similar to *M. fusiformis* (Brocchi).
- Mitra altilis* Bellardi, 1887, *ibid.***, p. 35, pl. 1, fig. 33 (Brodighera, Italy, L. Pliocene; 53 x 18 mm—juvenile specimen).
- Mitra amissa* Bellardi, 1887, *ibid.***, p. 11, pl. 1, fig. 5 (Stazzano, Italy, U. Miocene; 35 x 12 mm).
- Mitra amygdalacea* Bellardi, 1887, *ibid.***, p. 8, pl. 1, fig. 1 (Val Ceppi, Italy, M. Miocene; 30 x 12 mm).
- Mitra anceps* Bellardi, 1887, *ibid.***, p. 274, pl. 5, fig. 16 (Mioglia, Italy, L. Miocene; 40 x 14 mm—fragmented specimen).
- Mitra ancillaroides* Michelotti, 1847**, Nat. Verh. Holl. Maat. Haarlem, vol. 3, p. 309, pl. 17, fig. 12 (Tortone, Italy, Miocene; 30 x 10 mm); *M. ancillaroides* (sic) Bellardi, 1887, Mem. R. Accad. Sci. Torino, vol. 38, p. 10, pl. 3, fig. 6.
- Mitra anedota* Bellardi, 1887, *ibid.***, p. 275, pl. 5, fig. 19 (Mioglia, Italy, L. Miocene; 47 x 14 mm).
- Mitra anterior* Bellardi, 1887, *ibid.***, p. 18, pl. 1, fig. 16 (Val Ceppi ?, Italy, M. Miocene; 57 x 18 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra aperta* Bellardi, 1850**, Mem. R. Accad. Sci. Torino, ser. 2, vol. 11, p. 9, pl. 1, fig. 13 (Asti, Italy, Pliocene); 1887, Mem. R. Accad. Sci. Tor-

- ino, vol. 38, p. 42, pl. 3, figs. 19a, b; *M. aperta* var. *subturrilongata* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 141 (figd. in Sacco, 1904), p. 82, pl. 18, fig. 25).
- Mitra appeninica** Bellardi, 1887, *ibid.*, p. 275, pl. 5, fig. 17 (Cassinelle, Italy, L. Miocene; 54 x 18 mm).
- Mitra apposita** Bellardi, 1887, *ibid.*, p. 4, pl. 2, fig. 18 (Rio della Batteria; Baldissero-torinese, Italy, M. Miocene); Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *sulcatissima*, p. 138 (figd. in Sacco, 1904, p. 80, pl. 18, fig. 2) and var. *inflatabrevis*, p. 138 (figd. in Sacco, 1904, p. 80, pl. 18, fig. 3). Similar to *M. dufresni* Basterot, 1825.
- Mitra arata** Bellardi, 1887, *ibid.*, p. 65, pl. 3, figs. 60a, b (Val Ceppi, Italy, M. Miocene; 22 x 8 mm).
- Mitra arcta** Bellardi, 1887, *ibid.*, p. 78, pl. 4, fig. 49 (Viale; Cortandone, Zinola, Italy, L. Miocene; 47 x 12 mm). *M. arcta* var. *spiratobrevis* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 145 (figd. in Sacco, 1904, p. 83, pl. 18, fig. 51).
- Mitra arva** Bellardi, 1887, *ibid.*, p. 41, pl. 3, figs. 15a, b (Val Ceppi, Italy, M. Miocene; 13 x 6 mm).
- Mitra astensis** Bellardi, 1850, Mem. R. Accad. Sci. Torino, ser. 2, vol. 11, pl. 1, figs. 11, 12 (Asti, Italy, Pliocene); 1887, *ibid.*, p. 21, pl. 1, fig. 18; Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *apertocentrosa*, p. 140 (figd. in Sacco, 1904, p. 81, pl. 18, figs. 10, 11) and var. *acutolonga*, p. 140 (figd. in Sacco, 1904, p. 81, pl. 18, figs. 12, 13). Similar to *M. fusiformis* (Brocchi).
- Mitra atava** Bellardi, 1887, *ibid.*, p. 15, pl. 1, fig. 12 (Bordighera, Italy, L. Pliocene; 51 x 15 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra austriaca** Mayer-Eymar, 1898, Palaeontographica, vol. 30, p. 83 (Baden, Germany; ?Miocene).
- Mitra basteroti** Mayer-Eymar, 1891, Viertj. nat. Gesell. Zürich, vol. 35, p. 298 (March); 1891, Journal de Conchyliologie, vol. 39, p. 336, pl. 10, fig. 4 (July) [Moras; Saucats; Salles, France, Miocene; 19 x 7 mm]; Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 101, pl. 8, figs. 14-16. Probably conspecific with *M. striola* Grateloup, 1847. Plate 323G, fig. 4.
- Mitra biformis** Bellardi, 1887, *ibid.*, p. 52, pl. 3, fig. 37 (Val Ceppi, Italy, M. Miocene; 22 x 8 mm).
- Mitra bitenuata** Fontannes, 1880, Moll. plioc. vall. Rhone & Roussillon, vol. 1, p. 79, pl. 6, figs. 2a, b (Millas, Pyrénées-Orientales, France, Pliocene; 59 x 20 mm); with var. *rhodanica* Fontannes, 1880, p. 81, pl. 5, figs. 24a, b (same locality).
- Mitra bouilleana** Tournouer in Bouillé, 1876, Paleont. Biarritz, p. 11, pl. 1, fig. 5 (Biarritz, France, M. Miocene); Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 103, pl. 9, figs. 42, 43, with var. *sociata* Peyrot, 1928, *ibid.*, p. 104, pl. 9, fig. 44 (Orthez, France, M. Miocene).
- Mitra brachystoma** Bellardi, 1887, *ibid.*, p. 60, pl. 3, fig. 53 (Val Ceppi, Italy, M. Miocene; 19 x 8 mm).
- Mitra brevis** Bellardi, 1887, *ibid.*, p. 12, pl. 3, figs. 28a, b (Stazzano, Italy, U. Miocene; 21 x 10 mm); *Mitra perbrevis* Cossmann, 1920, Rev. Crit. Paléoz., vol. 24, p. 36 (substitute name for *M. brevis* Bellardi, 1887).
- Mitra casca** Bellardi, 1887, *ibid.*, p. 276, pl. 5, fig. 20 bis (Mioglia, Italy, L. Miocene; 48 x 16 mm).
- Mitra cassinellensis** Bellardi, 1887, *ibid.*, p. 275, pl. 5, fig. 18 (Cassinelle, Italy, L. Miocene; 50 x 17 mm).
- Mitra cepporum** Bellardi, 1887, *ibid.*, p. 78, pl. 4, fig. 47 (Rio della Batteria; Villa Forzano; Val Ceppi, Italy, M. Miocene; 38 x 11 mm); with var. *contortula* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 145 (figd. in Sacco, 1904, p. 83, pl. 18, fig. 49).
- Mitra clavata** Bellardi, 1887, *ibid.*, p. 6, pl. 4, fig. 39 (Termo-Foura, Italy, M. Miocene; 38 x 16 mm).
- Mitra cognatella** Bellardi, 1887, *ibid.*, p. 36, pl. 4, fig. 37 (Val Ceppi, Italy, M. Miocene; 43 x 16 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra cocconii** Mayer-Eymar, 1898, Palaeontographica, vol. 30, p. 83 (Italy; Pliocene) substitute name for *M. affinita* Cocconi, 1876 (non Lesson, 1842; nec Reeve, 1844). Similar to *M. incognita* Basterot, 1825.
- Mitra cohibita** Bellardi, 1887, *ibid.*, p. 81, pl. 2, fig. 6 (Val Ceppi, Italy, M. Miocene; 60 x 18 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra collata** Bellardi, 1887, *ibid.*, p. 22, pl. 1, fig. 20 (Valle Andona, Italy, U. Pliocene; 69 x 22 mm). Probably *M. fusiformis* (Brocchi).
- Mitra colligata** Bellardi, 1887, *ibid.*, p. 56, pl. 3, fig. 48 (Stazzano, Italy, U. Miocene; 15 x 6.5 mm).
- Mitra comperta** Rovereto, 1900 Illust. Moll. foss. Tongr., p. 172, pl. 8, fig. 6 (Carcare, Italy, Pliocene; 27 x 10.5 mm); Sacco, 1904, Moll. terr. terz. Piemonte, pt. 30, p. 83, pl. 18, fig. 53.
- Mitra concava** Bellardi, 1887, *ibid.*, p. 67, pl. 4,

- fig. 45 (Zinola, Italy, L. Pliocene; 37 x 14 mm).
***Mitra confinis* Bellardi, 1887, *ibid.*, p. 38, pl. 4, fig. 30** (Val Ceppi, Italy, M. Miocene; 28 x 11 mm).
***Mitra confundenda* Bellardi, 1887, *ibid.*, p. 82, pl. 5, fig. 3** (Baldissero-torinese, Italy, M. Miocene; 46 x 15 mm).
***Mitra connexa* Bellardi, 1887, *ibid.*, p. 38, pl. 4, fig. 31** (Val Ceppi, Italy, M. Miocene; 25 x 10 mm).
***Mitra conspicienda* Bellardi, 1887, *ibid.*, p. 18, pl. 1, fig. 14** (Sciolze, Italy, M. Miocene; 65 x 22 mm). Similar to *M. fusiformis* (Brocchi).
***Mitra constricta* Bellardi, 1887, *ibid.*, p. 20, pl. 4, fig. 26** (Monte dei Cappuccini, Italy, M. Miocene; 35 x 12.5 mm).
***Mitra contermina* Bellardi, 1887, *ibid.*, p. 33, pl. 1, fig. 31** (Stazzano, Italy, U. Miocene; 49 x 16 mm). Similar to *M. fusiformis* (Brocchi).
***Mitra contorta* Bellardi, 1887, *ibid.*, p. 60, pl. 3, fig. 52** (Val Ceppi, Italy, M. Miocene; 19 x 7 mm).
***Mitra corneti* Cossmann, 1920, Rev. Crit. Paléoz., vol. 24, p. 36** (substitute name for *M. vicina* Bellardi, 1887, Mem. R. Accad. Sci. Torino, vol. 38, p. 20, pl. 4, fig. 27—non *M. vicina* Briart & Cornet, 1871) [Stazzano; Tortone, Italy, U. Miocene].
***Mitra crassiuscula* Bellardi, 1887, *ibid.*, p. 56, pl. 3, fig. 47** (Rio della Batteria, Italy, M. Miocene; 16 x 6.5 mm).
***Mitra decipiens* Bellardi, 1887, *ibid.*, p. 36, pl. 1, fig. 35** (Albenga-Torsero; Bordighera, Italy, L. Pliocene; 54 x 17 mm). Similar to *M. fusiformis* (Brocchi).
***Mitra defossa* Bellardi, 1887, *ibid.*, p. i2, pl. 5, fig. 2** (Val Ceppi, Italy, M. Miocene; 54 x 16 mm).
***Mitra dertonensis* Michelotti, 1847, Nat. Verh. Holl. Maat. Haarlem, vol. 3, p. 317, pl. 17, fig. 15** (Tortone, Italy, Miocene; 44.0 mm); Bellardi, 1887, *ibid.*, p. 61, pl. 4, fig. 41.
***Mitra desita* Bellardi, 1887, *ibid.*, p. 27, pl. 1, fig. 23** (Valle Andona, Italy, U. Pliocene; 43 x 15 mm). Similar to *M. fusiformis* (Brocchi).
***Mitra destefanii* Brugnone, 1877, Boll. Soc. Malac. Italiana, vol. 3, p. 2, pl. 6, fig. 3** (Altavilla, Italy, Pliocene; 30 x 11 mm). Similar to *M. fusiformis* (Brocchi).
***Mitra deteria* Bellardi, 1887, *ibid.*, p. 45, pl. 3, figs. 21a, b** (Valle Andona, Italy, U. Pliocene). Similar to *M. cornicula* (Linnaeus, 1758).
***Mitra devia* Bellardi, 1887, *ibid.*, p. 10, pl. 3, fig. 7** (Stazzano, Italy, U. Miocene; 33 x 13 mm).
***Mitra dufresnei* Basterot, 1825, Mem. Soc. d'Hist. Nat. Bordeaux, vol. 2, p. 44, pl. 2, fig. 8** (Dax,

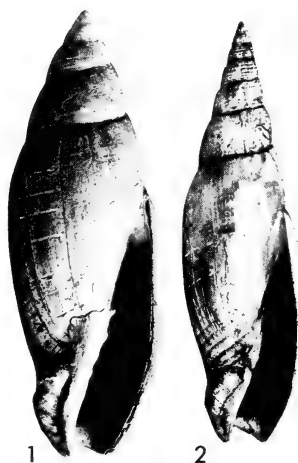


Plate 323E. *Mitra (Mitra) dufresnei* Basterot.

Fig. 1. Specimen from Saubrigues, Miocene of France (from Peyrot, 1928, pl. 9, fig. 36; c. 91.0 mm).

Fig. 2. Specimen from Saucats, Dax, Miocene of France; slender form *subelongata* Peyrot (from Peyrot, 1928, pl. 9, fig. 38; c. 81.0 mm).

- France; Miocene); Bellardi, 1887, *ibid.*, p. 4; Sacco, 1904, Moll. terr. terz. Piemonte p. 80, pl. 18, fig. 1; Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 296, pl. 9, figs. 34-36.
***Mitra elongata* Grateloup, 1833, Act. Soc. Linn. Bordeaux, vol. 6, p. 286; 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 37, figs. 3, 4** (non *M. elongata* Lamarck, 1803); Grateloup, 1847, Conch. foss. terr. Tert. Adour, Atlas, with var. *aquensis*, pl. 1, fig. 2, and *burdigalensis*, pl. 1, fig. 1. ?
***Mitra ventricosa* Grateloup, 1847, *ibid.*, pl. 1, fig. 16** (? juvenile of *M. dufresnei*) [non *M. ventricosa* Risso, 1826]; *M. subventricosa* d'Orbigny, 1852, Prodr. Paléont. strat. Univ., vol. 3, p. 10 (Dax, France, Miocene [substitute name for *M. ventricosa* Grateloup, 1847]). *M. dufresnei* var. *subelongata* "d'Orbigny", Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 96, pl. 9, figs. 37, 38 (Saucats; Dax, France, Miocene). **Plate 323E, figs. 1 and 2.**
***Mitra dujardini* Ivolas & Peyrot, 1900, Act. Soc. Linn. Bordeaux, vol. 55, p. 109** (substitute name for *M. olivaeformis* Dujardin, 1837, Mém. Soc. géol. France, vol. 2, p. 301, pl. 20, fig. 25—non Swainson, 1821) [environs de Tours, France, Miocene]; *Mitraria dujardini* Ivolas & Peyrot, Glibert, 1952, Mém. Inst. Roy. Sci. Nat. Belg.,

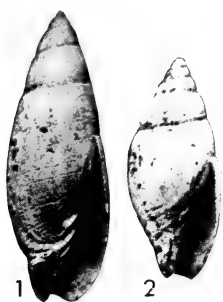


Plate 323F. Fig. 1. *Mitra (Mitra) dujardini* Ivolas and Peyrot. Paulmy, Loire, Miocene of France (from Glibert, 1952, pl. 12, fig. 4; c. 37.0 mm).

Fig. 2. *M. (M.) subcylindrica* Dujardin. Le Louroux, Loire, Miocene of France (from Glibert, 1952, pl. 12, fig. 6; c. 23.0 mm).

ser. 2, no. 46, p. 363, pl. 12, fig. 4. There is some doubt as to the familial position of the species. Hörnes (1856) synonymizes the species with *Lapparia papillaris* (Borson, 1820), family Volutidae, while Glibert (1952) assigns the species to *Mitra* s. str. Plate 323F, fig. 1.

Mitra educta Bellardi, 1887, *ibid.*, p. 82, pl. 5, fig. 1 (Val Ceppi, Italy, M. Miocene; 50 x 14 mm).

Mitra eofusiformis Bellardi, 1887, *ibid.*, p. 19, pl. 1, fig. 17 (Pino-torinese, Italy, M. Miocene; 53 x 17 mm); *M. eofusiformis* var. *subperplicata* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 139 (figd. in Sacco, 1904, p. 81, pl. 18, fig. 7).

Mitra escoffierae Fontannes, 1880, Moll. plioc. vall. Rhone & Roussillon, p. 82, pl. 5, figs. 25a, b (Saint-Restitut, France, Pliocene; 39.0 x 13.5 mm).

Mitra exacuta Bellardi, 1887 *ibid.*, p. 276, pl. 5, fig. 20 (Mioglia, Italy, L. Miocene; 36 x 16 mm).

Mitra expressa Bellardi, 1887, *ibid.*, p. 26, pl. 3, fig. 11 (Villalvernia-Braia, Italy, U. Pliocene; 28 x 8 mm).

Mitra facilis Mayer-Eymar, 1891, Viertj. nat. Gesell. Zürich, vol. 35, p. 299; 1891, Journal de Conchyliologie, vol. 39, p. 338, pl. 10, fig. 6 (Lapugy, Vienna Basin, Miocene; 15 x 6 mm). Probably only a broad form of *M. striola* Grateloup, 1847.

Mitra finitima Bellardi, 1887, *ibid.*, p. 48, pl. 3, fig. 26 (Rio della Batteria; Val Ceppi, Italy, M. Miocene; 20 x 8 mm).

Mitra gemina Bellardi, 1887, *ibid.*, p. 26, pl. 3, fig. 9 (Villalvernia-Fontanili, Italy, U. Pliocene; 33 x 10 mm).

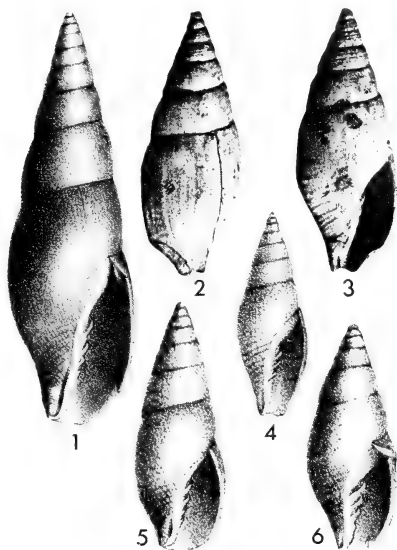


Plate 323G. Tertiary European *Mitra*.

Fig. 1. *Mitra (Mitra) praenigra* Mayer-Eymar from Lapugy, Vienna Basin, Miocene of Rumania (from Mayer-Eymar, 1891, pl. 10, fig. 9; 58.0 x 19.0 mm).

Figs. 2, 3. *M. (M.) incognita* Basterot from Saucats, Miocene of France (from Peyrot, 1928, pl. 9, figs. 15, 16; c. 26.0 mm).

Fig. 4. *M. (M.) basteroti* Mayer-Eymar from Saucats, Miocene of France (from Mayer-Eymar, 1891, pl. 10, fig. 4; 19.0 x 7.0 mm).

Fig. 5. *M. (M.) paulensis* Mayer-Eymar from St. Paul-des-Dax, Miocene of France (from Mayer-Eymar, 1891, pl. 10, fig. 8; 27.0 x 19.5 mm).

Fig. 6. *M. (M.) multistriata* Mayer-Eymar from Lapugy, Vienna Basin, Miocene of Rumania (from Mayer-Eymar, 1891, pl. 10, fig. 7; 25.0 x 10.0 mm).

Mitra gentilis Bellardi, 1887, *ibid.*, p. 39, pl. 4, fig. 3 (Val Ceppi, Italy, M. Miocene; 20 x 8 mm).

Mitra gravis Bellardi, 1887, *ibid.*, p. 11, pl. 1, fig. 6 (Stazzano, Italy, U. Miocene; 42 x 15 mm).

Mitra graviuscula Bellardi, 1887, *ibid.*, p. 49, pl. 3, fig. 30 (Val Ceppi, Italy, M. Miocene; 17 x 7 mm). Similar to *M. cornicula* (Linnaeus).

Mitra hilberi Hoernes & Auinger, 1880, Abh. k. k. geol. Reichs-Anst. Wien, vol. 12, p. 76, pl. 9, figs. 9, 10a, b (Drnowitz; Lissitz; Lapugy, Vienna Basin, Miocene; 44 x 12 mm). *M. hilberi* var. *pseudopolygyrata* Strausz, 1966, Akad. Kiado Budapest, p. 363 (Szob, Hungary, Miocene) [proposed as a varietal name—invald according to the Code of ICZN]. The species is similar to *M. fusiformis* (Brocchi).

- Mitra hoernesii* Mayer, 1864, Tertiärf. Azor. Madeira, p. 82 (substitute name for *M. aperta* Hörnes, 1856, Abh. k. k. geol. Reichs-Anst. Wien, vol. 3, p. 97, pl. 10, figs. 1-3—non Bellardi, 1850 [Vienna Basin, Miocene]. *Mitra brusinae* Hoernes & Auinger, 1880, Abh. k. k. geol. Reichs-Anst. Wien, vol. 12, p. 76, pl. 9, figs. 1a, b, 2 (Lapugy, Vienna Basin, Miocene). *M. ambigua* Friedberg, 1911, Moll. Mioc. Polon. Reg. vic. Cracow, p. 10, pl. 1, fig. 6 (Wolyn, Poland, Miocene; 33 x 11 mm) [non *M. ambigua* Swainson, 1829]. *M. friedbergi* Cossmann, 1912, Rev. Crit. Paléoz., vol. 7, p. 214 (substitute name for *M. ambigua* Friedberg, 1911). The species is similar to *M. fusiformis* (Brocchi).
- Mitra imminuta* Bellardi, 1887, *ibid.*, p. 28, pl. 4, fig. 28 (Villalvernia-Fontanili, Italy, U. Pliocene; 36 x 14 mm).
- Mitra implicata* Bellardi, 1887, *ibid.*, p. 27, pl. 1, fig. 27 (Bordighera, Italy, L. Pliocene; 38 x 13 mm).
- Mitra incerta* Bellardi, 1887, *ibid.*, p. 51, pl. 3, figs. 35 a, b (Val Ceppi, Italy, M. Miocene; 17 x 7 mm).
- Mitra incognita* Basterot, 1825, Mem. Mus. d'Hist. Nat. Bordeaux, p. 45, pl. 4, fig. 5 (Saucats, France, Miocene); Grateloup, 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 1, fig. 8; Hoernes & Auinger, 1880, Abh. k. k. geol. Reichs-Anst. Wien, vol. 12, p. 79, pl. 9, figs. 3-5; Bellardi, 1887, Mem. R. Accad. Sci. Torino, vol. 38, p. 58; Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 99, pl. 9, figs. 15, 16, 29-31. *M. clavularis* Grateloup, 1834, Act. Soc. Linn. Bordeaux, vol. 6, p. 287 (Dax, France, Miocene); 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 1, fig. 10. *M. fusiformis* Dujardin, 1837, Mém. Soc. géol. France, vol. 2, p. 300 (non Brocchi, 1814). *M. burgetiana* Grateloup, 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 1, fig. 9 (non Grateloup, 1834); with var. *laevigata* Grateloup, 1847, *ibid.*, pl. 1, fig. 11 (non Bosc, 1801). *M. bouei* Hoernes & Auinger, 1880, Abh. k. k. geol. Reichs-Anst. Wien, vol. 12, p. 79, pl. 9, figs. 6, 7 (Lapugy, Vienna Basin, Miocene; 29 x 9 mm). *M. paulensis* Mayer-Eymar, 1891, Viertj. nat. Gesell. Zürich, vol. 35, p. 300 (substitute name for *M. incognita* Grateloup, 1847); Mayer-Eymar, 1891, Journal de Conchyliologie, vol. 39, p. 340, pl. 10, fig. 8 (Cabannes; Mandillot St. Paul, France, Miocene; 27 x 9.5 mm). *M. miogallica* Peyrot, 1938, Act. Soc. Linn. Bordeaux, vol. 89, p. 239, pl. 5, figs. 36, 39 (Pont-Levoy, Bassin Ligérien, Touraine, France, Miocene). Plate 323G, figs. 2, 3, 5.
- Mitra indicata* Bellardi, 1887, *ibid.*, p. 49, pl. 3, figs. 29a, b (Stazzano, Italy, U. Miocene; 19 x 8 mm).
- Mitra indistincta* Bellardi, 1887, *ibid.*, p. 59, pl. 3, fig. 45 (Villa Forzano, Italy, M. Miocene; 17 x 6 mm).
- Mitra inedita* Bellardi, 1887, *ibid.*, p. 30, pl. 1, fig. 26 (Valle Andona, Italy, U. Pliocene; 58 x 18 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra infundibulum* Bellardi, 1887, *ibid.*, p. 12, pl. 1, fig. 8 (Stazzano, Italy, U. Miocene; 40 x 13 mm).
- Mitra interiecta* Bellardi, 1887, *ibid.*, p. 29, pl. 1, fig. 28 (Valle Andona, Italy, U. Pliocene; 43 x 14 mm).
- Mitra intermissa* Bellardi, 1887, *ibid.*, p. 61, pl. 3, fig. 55 (Val Ceppi, Italy, M. Miocene; 19 x 7 mm).
- Mitra iriensis* Bellardi, 1887, *ibid.*, p. 66, pl. 4, fig. 43 (Stazzano, Italy, U. Miocene; 48 x 21 mm).
- Mitra junior* Bellardi, 1887, *ibid.*, p. 79, pl. 4, fig. 51 (Valle Andona, Italy, U. Pliocene; 35 x 10 mm). *M. junior* var. *magnoperstriata* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 145 (figd. in Sacco, 1904, p. 83, pl. 18, fig. 52).
- Mitra laxesulcata* Bellardi, 1887, *ibid.*, p. 7, pl. 3, figs. 2a, b (Pino-torinese, Italy, M. Miocene; 18 x 8 mm).
- Mitra lecta* Bellardi, 1887, *ibid.*, p. 50, pl. 3, figs. 32a, b (Val Ceppi, Italy, M. Miocene; 26 x 8 mm).
- Mitra lineolata* Bellardi, 1887, *ibid.*, p. 46, pl. 3, figs. 24a, b (Bersano, Italy, M. Miocene; 20 x 10 mm).
- Mitra longispirata* Bellardi, 1887, *ibid.*, p. 64, pl. 4, fig. 5 (Rio della Batteria, Italy, M. Miocene; 29 x 9 mm).
- Mitra macilenta* Bellardi, 1887, *ibid.*, p. 52, pl. 3, fig. 38 (Val Ceppi, Italy, M. Miocene; 18 x 5.5 mm).
- Mitra mancietensis* Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 104, pl. 11, figs. 54, 55 (Manciet, France, Miocene; 8 x 4.5 mm).
- Mitra megaspira* Bellardi, 1850, Mem. R. Accad. Sic. Torino, ser. 2, vol. 11, p. 12, pl. 1, fig. 19 (Piemonte, Italy, Miocene); Bellardi, 1887, *ibid.*, p. 63, pl. 4, fig. 34 (36 x 11 mm).
- M. melanopsiformis* Cox, 1936, Mem. Nat. Mus. Min. Geol. Univ. Coimbra, no. 9, p. 22, pl. 2, figs. 4a, b (Mina, São Pedro del Moel, Portugal, Pliocene). Similar to *M. nigra* (Gmelin).
- Mitra miocenica* Michelotti, 1847, Nat. Verh. Holl. Maat. Haarlem, vol. 3, p. 310 (Torino,

- Italy, Miocene); Bellardi, 1887, *ibid.*, p. 22, pl. 1, fig. 19. Similar to *M. fusiformis* (Brocchi).
- Mitra multistriata** Bellardi, 1887, *ibid.*, p. 40, pl. 3, figs. 14a, b (Val Ceppi, Italy, M. Miocene; 16 x 6 mm). **Plate 323G, fig. 6.**
- Mitra nassaeformis** Bellardi, 1887, *ibid.*, p. 42, pl. 3, fig. 18 (Sant' Agata, Italy, U. Miocene; 10 x 4 mm); *M. nassaeformis elongata* Toldo, 1889, Bull. Soc. Malac. Ital., vol. 14, p. 144 (Montegibio, Italy, U. Miocene) [non *M. elongata* Lamarck, 1803].
- Mitra neglecta** Bellardi, 1887, *ibid.*, p. 58, pl. 3, figs. 50a, b (Val Ceppi, Italy, M. Miocene; 24 x 8 mm).
- Mitra nucleus** Bellardi, 1887, *ibid.*, p. 50, pl. 5, fig. 12 (Thermo-Fourá, Italy, M. Miocene; 14 x 6 mm).
- Mitra obarata** Bellardi, 1887, *ibid.*, p. 13, pl. 1, fig. 10 (Torino, Italy, M. Miocene; 50 x 17 mm).
- Mitra oerrans** Bellardi, 1887, *ibid.*, p. 11, pl. 1, fig. 7 (Stazzano, Italy, U. Miocene; 40 x 15 mm).
- Mitra obesata** Bellardi, 1887, *ibid.*, p. 34, pl. 2, fig. 20 (Zinola near Savona; Albenga-Torsero, Italy, L. Pliocene; 78 x 25 mm). Probably a broad form of *M. fusiformis* (Brocchi).
- Mitra oblongula** Bellardi, 1887, *ibid.*, p. 36, pl. 3, fig. 13 (Val Ceppi, Italy, M. Miocene; 25 x 9 mm) [as *M. oblongata* on plate explanations].
- Mitra observabilis** Bellardi, 1887, *ibid.*, p. 41, pl. 3, figs. 16a, b (Val Ceppi, Italy, M. Miocene; 13 x 5.5 mm).
- Mitra offerta** Bellardi, 1887, *ibid.*, p. 9, pl. 1, fig. 3 (Sant' Agata, Italy, U. Miocene; 34 x 13 mm).
- Mitra omissa** Bellardi, 1887, *ibid.*, p. 63, pl. 3, fig. 57 (Val Ceppi, Italy, M. Miocene; 25 x 9 mm).
- Mitra optica** Bellardi, 1887, *ibid.*, p. 59, pl. 3, fig. 57 (Villa Forzano, Italy, M. Miocene; 24 x 9 mm).
- Mitra parens** Bellardi, 1887, *ibid.*, p. 80, pl. 2, fig. 3 (Val Ceppi, Monte dei Cappuccini, Italy, M. Miocene; 66 x 19 mm).
- Mitra paucigrata** Bellardi, 1887, *ibid.*, p. 51, pl. 3, figs. 34a, b (Val Ceppi, Italy, M. Miocene; 27 x 9 mm); *M. polygrata* Bellardi, 1888, Mem. R. Accad. Sci. Torino, vol. 39, p. 40 (substitute name for *M. paucigrata* Bellardi, 1887).
- Mitra pectinata** Bellardi, 1887, *ibid.*, p. 65, pl. 4, fig. 42 (Val Ceppi, Italy, M. Miocene; 39 x 12 mm).
- Mitra peracuta** Bellardi, 1887, *ibid.*, p. 80, pl. 2, fig. 2 (Piano dei Boschi near Pino-Torinese, Italy, M. Miocene; 57 x 15 mm). Similar to slender *M. fusiformis* (Brocchi).
- Mitra pereirai** Brébion, 1957, Commun. Serv. geol. Portug., vol. 38, p. 241 (Cacela, Portugal, Miocene). Similar to *M. fusiformis* (Brocchi).
- Mitra (Mitra) pilsbryi** Boettger, 1906, Verh. Mitt. Ver. Herrmannstadt, vol. 54, p. 6 (Kostej, Banat, Miocene); Zilch, 1934, Senckenbergiana, vol. 16, p. 260, pl. 17, fig. 21 (figured holotype). Similar to *M. cornicula* (Linnaeus).
- Mitra pliocenica** Bellardi, 1887, *ibid.*, p. 17, pl. 2, fig. 21 (Valle Andona, Italy, U. Pliocene; 98 x 28 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra ponderosa** Bellardi, 1887, *ibid.*, p. 50, pl. 3, fig. 3 (Ceppi, Italy, M. Miocene; 26 x 11 mm).
- Mitra praenigra** Mayer-Eymar, 1891, Viertj. nat. Gesell. Zürich, vol. 35, p. 300; 1891, Journal de Conchyliologie, vol. 39, p. 342, pl. 10, fig. 9 (Lapugy, Vienna Basin, Miocene; 58 x 19 mm). **Plate 323G, fig. 1.**
- Mitra producta** Bellardi, 1887, *ibid.*, p. 55, pl. 3, figs. 44a, b (Val Ceppi, Italy, M. Miocene; 22 x 7.5 mm).
- Mitra pseudopapalis** Michelotti, 1838, Geog.-zool. Ans. Tert. Bild. Piemontis, p. 396 (Piemonte, Italy, Pliocene); *M. densesulcata* Bellardi, 1887, *ibid.*, p. 13, pl. 3, fig. 4, (Valle Andona, Italy, U. Pliocene).
- Mitra reducta** Bellardi, 1887, *ibid.*, p. 41, pl. 3, figs. 17a, b (Val Ceppi, Italy, Middle Miocene; 12 x 5 mm).
- Mitra repleta** Bellardi, 1887, *ibid.*, p. 26, pl. 3, fig. 8 (Villalvernina-Braia, Italy, U. Pliocene; 30 x 11 mm).
- Mitra sabatica** Bellardi, 1887, *ibid.*, p. 20, pl. 4, fig. 1 (Savona-Fronaci, Italy, L. Pliocene; 28 x 8 mm).
- Mitra sallomacensis** Mayer-Eymar, 1891, Viertj. nat. Gesell. Zürich, vol. 35, p. 301; 1891, Journal de Conchyliologie, vol. 39, p. 343, pl. 10, fig. 10 (Salles, France and Parma, Italy; Miocene). Peyrot's figure (1928) of the species is a *Cancilla* and Glibert (1960) assigns the species to *Cancilla*, but Mayer-Eymar's type-figure is a *Mitra s. str.* which closely resembles *M. incognita* Basterot, 1825.
- Mitra scalarata** Bellardi, 1850, Mem. R. Accad. Sci. Torino, ser. 2, vol. 11, p. 5, pl. 1, fig. 5 (Piemonte, Italy, Miocene); Bellardi, 1887, *ibid.*, p. 66, pl. 4, fig. 44; Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *posticoangulosa*, p. 143 (figd. in Sacco, 1904, p. 82, pl. 18, fig. 39) and var. *subiriensis*, p. 143 (figd. in Sacco, 1904, p. 82, pl. 18, fig. 40).
- Mitra semiarata** Bellardi, 1887, *ibid.*, p. 55, pl. 3, figs. 43a, b (Val Ceppi, Italy, M. Miocene; 22 x 8 mm).

- Mitra semicathrata* Bellardi, 1887, *ibid.*, p. 64, pl. 3, figs. 59a, b (Val Ceppi, Italy, M. Miocene; 22 x 7 mm).
- Mitra singularis* Bellardi, 1887, *ibid.*, p. 53, pl. 3, fig. 40 (Val Ceppi, Italy, M. Miocene; 31 x 11 mm).
- Mitra spirata* Bellardi, 1887, *ibid.*, p. 37, pl. 4, fig. 38 (Bersano, Italy, M. Miocene; 42 x 16 mm).
- Mitra stazzanensis* Bellardi, 1887, *ibid.*, p. 11, pl. 1, fig. 4 (Stazzano, Italy, U. Miocene; 26 x 10 mm).
- Mitra striola* Grateloup, 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 1, fig. 16 (Dax, France; L. Miocene).
- Mitra subangulata* Bellardi, 1887, *ibid.*, p. 52, pl. 3, fig. 39 (Val Ceppi, Italy, M. Miocene; 14 x 5 mm).
- Mitra subcaudata* Bellardi, 1887, *ibid.*, p. 81, pl. 2, fig. 4 (Val Ceppi, Italy, M. Miocene; 70 x 19 mm).
- Mitra subcylindrica* Dujardin, 1837, Mém. Soc. géol. France, vol. 2, p. 301, pl. 20, fig. 20 (environs de Tours, Pontlevoy, France; Miocene); Glibert, 1952, Mém. Inst. Roy. Sci. Nat. Belg., ser. 2, no. 46, p. 364, pl. 12, fig. 6. Similar to *M. incognita* Basterot, 1825. Plate 323F, fig. 2.
- Mitra submarginata* Bellardi, 1887, *ibid.*, p. 29, pl. 1, fig. 24 (Bordighera, Italy, L. Pliocene; 56 x 18 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra subestriata* Bellardi, 1887, *ibid.*, p. 35, pl. 1, fig. 34 (Zinola near Savona; Albenga-Torsero, Italy, L. Pliocene; 56 x 18 mm).
- Mitra sublaevis* Bellardi, 1887, *ibid.*, p. 61, pl. 4, fig. 40 (Scioltze, Italy, M. Miocene; 30 x 10 mm).
- Mitra submutica* d'Orbigny, 1852, Prodr. Paléont. strat. Universelle, vol. 3, p. 10 (Dax, France; Miocene) [substitute name for *M. mutica* Grateloup, 1847, Conch. foss. terr. Tert. Adour, Atlas, pl. 1, fig. 22—non Lamarck, 1803].
- Mitra subtenuistria* Peyrot, 1928, Act. Soc. Linn. Bordeaux, Suppl. vol. 79, p. 105, pl. 9, figs. 5, 23, 60 (Salies-de-Béarn, France, Miocene; 19 x 7 mm).
- Mitra subuliformis* Bellardi, 1887, *ibid.*, p. 55, pl. 3, fig. 42 (Val Ceppi, Italy, M. Miocene; 20 x 6 mm).
- Mitra subumbilicata* Bellardi, 1850, Mem. R. Accad. Sci. Torino, ser. 2, vol. 11, p. 10, pl. 1, fig. 17 (Piemonte, Italy, Miocene); Bellardi, 1887, *ibid.*, p. 46, pl. 3, figs. 25a, b; Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *longoventrosa*, p. 142 (figd. in Sacco, 1904, p. 82, pl. 18, figs. 30, 31) and var. *perlongoacuta*, p. 142 (figd. in Sacco, 1904, pl. 18, fig. 32).
- Mitra sulcatulata* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 138 (Val Ceppi; Terno-Fourà, Italy, M. Miocene) [new name for *M. brevispirata* var. A, Bellardi, 1887, Mem. R. Accad. Sci. Torino, vol. 38, p. 6, pl. 3, fig. 1—non *M. brevispirata* Speyer, 1862]; *M. brevispirata* var. *sulcatulata* Sacco, 1904, Moll. terr. terz. Piemonte, pt. 30, p. 81, pl. 18, fig. 4 (as *sulcatulata* on plate explanations).
- Mitra sulciensis* Bellardi, 1887, *ibid.*, p. 13, pl. 1, fig. 9 (Scioltze, Italy, M. Miocene; 46 x 16 mm).
- Mitra supergensis* Bellardi, 1887, *ibid.*, p. 48, pl. 3, fig. 27 (Val Ceppi, Italy, M. Miocene). Similar to *M. incognita* Basterot, 1825.
- Mitra taeniolata* Bellardi, 1887, *ibid.*, p. 5, pl. 2, fig. 11 (Val Ceppi, Italy, M. Miocene; 55 x 20 mm). Similar to *M. dufresnei* Basterot, 1825.
- Mitra taurinensis* Bellardi, 1887, *ibid.*, p. 14, pl. 1, fig. 11 (Monte dei Cappuccini, Italy, M. Miocene). Similar to *M. fusiformis* (Brocchi).
- Mitra terebriformis* Bellardi, 1887, *ibid.*, p. 63, pl. 3, fig. 58 (Val Ceppi, Italy, M. Miocene; 16 x 5 mm).
- Mitra teres* Bellardi, 1887, *ibid.*, p. 62, pl. 3, figs. 56a, b (Val Ceppi, Italy, M. Miocene; 21 x 6 mm).
- Mitra tracta* Bellardi, 1887, *ibid.*, p. 17, pl. 2, fig. 17 (Valle Andona, Italy, U. Pliocene; 100 x 28 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra tumefacta* Bellardi, 1887, *ibid.*, p. 39, pl. 4, fig. 33 (Stazzano, Italy, U. Miocene; 32 x 14 mm). Similar to *M. incognita* Basterot, 1825.
- Mitra tumens* Bellardi, 1887, *ibid.*, p. 7, pl. 3, fig. 3 (Val Ceppi, Italy, M. Miocene; 19 x 7 mm).
- Mitra turbinata* Bellardi, 1887, *ibid.*, p. 45, pl. 3, fig. 22 (Val Ceppi, Italy, M. Miocene; 19 x 9 mm).
- Mitra turris* Bellardi, 1887, *ibid.*, p. 60, pl. 3, fig. 54 (Val Ceppi, Italy, M. Miocene; 23 x 9 mm).
- Mitra umbilicosa* Bellardi, 1887, *ibid.*, p. 81, pl. 2, fig. 5 (Monte dei Cappuccini, Italy, M. Miocene; 68 x 18 mm). Similar to *M. fusiformis* (Brocchi).
- Mitra vapincana* Boussac, 1911, Mém. Cart. géol. France, p. 365 (France; Tertiary). The assignment of the species in the Mitrinae is only tentative.
- Mitra venusta* Bellardi, 1887, *ibid.*, p. 71, pl. 4, fig. 46 (Stazzano, Italy, U. Miocene; 23 x 9 mm). This may be a juvenile of *M. goniophora* Bellardi, 1850.
- Mitra villalvernensis* Bellardi, 1887, *ibid.*, p. 44, pl. 3, fig. 20 (Villalvernia-Fontanili, Italy, U. Pliocene; 27 x 10 mm); Sacco, 1890, Cat.

paleont. Bac. terz. Piemonte, with var. *ventricoangulosa*, p. 141 (figd. in Sacco, 1904, p. 82, pl. 18, fig. 26), var. *ventrosoparva*, p. 142 (figd. in Sacco, 1904, p. 82, pl. 18, figs. 27, 28), and var. *longoturrita*, p. 142 (figd. in Sacco, 1904, p. 82, pl. 18, fig. 29).

**Pre-occupied species-names
for European Tertiary *Mitra***

- Mitra aemula* Bellardi, 1887, *ibid.*, p. 78, pl. 4, fig. 48** (Pino-Torinese; Piano dei Boschi, Italy, M. Miocene; 34 x 9 mm) [non E. A. Smith, 1879].
- Mitra apicalis* Bellardi, 1887, *ibid.*, p. 56, pl. 3, fig. 46** (Val Ceppi, Italy, M. Miocene; 13 x 5 mm) [non Hutton, 1873].
- Mitra compressa* Bellardi, 1887, *ibid.*, p. 52, pl. 3, fig. 36** (Val Ceppi, Italy, M. Miocene; 19 x 8 mm) [non Sowerby, 1874].
- Mitra doliolum* Bellardi, 1887, *ibid.*, p. 8, pl. 3, fig. 5** (Stazzano, Italy, U. Miocene; 31 x 13 mm) [non Küster, 1839].
- Mitra minor* Bellardi, 1887, *ibid.*, p. 28, pl. 3, fig. 12** (Valle Andona, Italy, U. Pliocene; 22 x 10) [non Weinkauff, 1868; nec Sowerby, 1874]. *M. depressobrevis* Sacco, 1890, Cat. paleont. bac. terz. Piemonte, p. 140 (figd. in Sacco, 1904, p. 81, pl. 18, figs. 18a, b) proposed as a new name for *M. minor* var. A. Bellardi, is an available replacement name.
- Mitra multistriata* Mayer-Eymar, 1891, Viertj. nat. Gesell. Zurich, vol. 35, p. 299; 1901, Journal de Conchyliologie, vol. 39, p. 339, pl. 10, fig. 7** (Lapugy, Vienna Basin, Miocene; 25 x 10 mm) [non Bellardi, 1887].
- Mitra perlonga* Bellardi, 1887, *ibid.*, p. 80, pl. 2, fig. 1** (Monte dei Cappuccini, Italy, M. Miocene; 76 x 20 mm) [non Martin, 1884]. Appears to be a slender *M. fusiformis* (Brocchi).
- Mitra propinqua* Bellardi, 1887, *ibid.*, p. 39, pl. 4, fig. 32** (Val Ceppi, Italy, M. Miocene; 28 x 11 mm) [non A. Adams, 1853].
- Mitra proxima* Bellardi, 1887, *ibid.*, p. 18, pl. 1, fig. 15** (Val Ceppi, Italy, M. Miocene; 59 x 20 mm) [non G. & H. Nevill, 1875]. Similar to *M. fusiformis* (Brocchi).
- Mitra suturalis* Bellardi, 1887, *ibid.*, p. 51, pl. 3, figs. 33a, b** (Val Ceppi, Italy, M. Miocene; 20 x 7 mm) [non Bosquet, 1859].
- Mitra turgida* Bellardi, 1887, *ibid.*, p. 45, pl. 3, figs. 23a, b** (Val Ceppi, Italy, M. Miocene; 23 x 14 mm) [non Reeve, 1845].
- Mitra turricula* Cristofori & Jan, 1832, Cat. Mus. Conch. foss., vol. 2, p. 14** (Italy; Pliocene) [non *Voluta turricula* Holten, 1802 = *Mitra*]; Bellardi, 1887, *ibid.*, p. 15, pl. 1, fig. 13, with var. A and B; Sacco, 1890, Cat. paleont. bac. terz. Piemonte, with var. *minutesulcata*, p. 139 (figd. in Sacco, 1904, p. 81, pl. 18, fig. 5) and var. *labiatorima*, p. 139 (figd. in Sacco, 1904, p. 81, pl. 18, fig. 6); *Mitraria turricula* Jan, Glibért, 1960, Mém. Inst. Roy. Sci. Nat. Belg., ser. 2, fasc. 61, p. 42. *Mitra turricula* Cristofori & Jan, is a secondary homonym of *Voluta turricula* Holten, which is a synonym of *Mitra* (*Nebularia*) *cucumerina* (Lamarck).
- Mitra umbilicata* Bellardi, 1887, *ibid.*, p. 37, pl. 4, fig. 36** (Savona-Fornaci, Italy, L. Pliocene; 58 x 20 mm) [non Cossmann & Lambert, 1884].

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

Synonymy—

1855 *Fusimitra* Conrad, Proc. Acad. Nat. Sci. Philadelphia, vol. 7, no. 7, p. 261; type-species by subsequent designation, Grant & Gale, 1931: *Mitra mellingtoni* Conrad [= *M. mellingtoni* Conrad in Wailes, 1854 = *M. conquisita* Conrad, 1848].

Subgenus *Fusimitra* Conrad, 1855

Type: *Mitra conquisita* Conrad, 1848

Species of the subgenus *Fusimitra* are characterized by shells which are moderately small to large and show a mixture of overlapping generic characters between juvenile and immature specimens and adults. Young specimens of *Fusimitra* are spirally striate or corded, the cords are numerous and close-set and the narrow interstices are axially striate. These juvenile and immature individuals could be assigned to the genus *Cancilla*. However, in the Indo-Pacific—West African *Cancilla* species, the spiral sculpture is appreciably more regular and always prominent in adult and senile specimens, whereas in the American *Fusimitra* spiral sculpture becomes obsolete with maturity. Young and immature specimens of the fossil *M. conquisita mellingtoni* Conrad, *M. titan* Gabb and *M. limonensis* Olsson, have a more slender, *Cancilla*-like form with a spiral sculpture of confused and close-set spiral threads, but adult individuals of these species closely resemble the living *M. swainsonii* Broderip, which is a typical *Mitra*.

Bearing in mind the evolution of the Recent *M. swainsonii* from ancestral stock like the Eocene-Oligocene *M. conquisita* and the Miocene species *M. titan* and the several Miocene subspecies of *M. swainsonii*, it is concluded that species of *Cancilla* do not and did not live in the East Pacific-Caribbean province. The *Cancilla*-like sculpture of young specimens of *Fusimitra* is only a developmental phase of ornamentation and not a permanent diagnostic character as in the Indo-Pacific-West African *Cancilla*. The radula of *Cancilla isabella* (Swainson), the type-species of *Cancilla*, still remains unknown, and it is a matter for conjecture whether *Cancilla* is of mitrine stock or more closely related to the imbricariine genus *Subcancilla* Olsson & Harbison.

Fusimitra has been incorrectly used as a genus-group for European Eocene vexilline *Costellaria* species by Cossmann (various Journals) and Villalta Comella (1956).

***Mitra scotlandica* Trechmann, 1925**

(Pl. 324)

Range—Eocene of Barbados.

Remarks—The species is superficially similar to *M. swainsonii* Broderip, but is smaller, the whorls are regularly convex and the sculpture consists of numerous, close-set, longitudinal growth-striae. The aperture is longer than the spire, the base of the last whorl is prominently constricted near the base and the siphonal canal is slender and elongated; the columella is not callosed and has 3 moderately thin and distant folds.

The holotype is in the Department of Paleontology, British Museum (NH) no. G-79264, and measures length 48.0 mm, with 17.7 mm, height of aperture 28.4 mm.

Synonymy—

1925 *Mitra scotlandica* Trechmann, Geological Magazine, London, vol. 62, p. 488, pl. 22, fig. 2 (Spa, Scotland district, Scotland beds, Barbados; Middle-Upper Eocene).

***Mitra uvasana* Dickerson, 1915**

(Pl. 325, fig. 1)

Range—Upper Eocene of California.

Remarks—The species appears to be rare and is

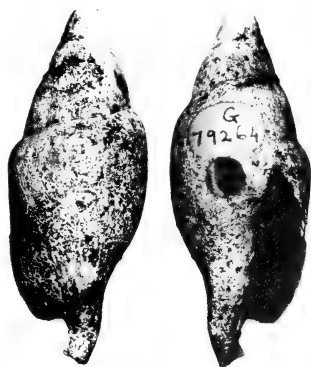


Plate 324. *Mitra (Fusimitra) scotlandica* Trechmann. Holotype from Spa, Scotland district, Barbados Id., Caribbean (Dept. Palaeont. BM (NH) G-79264; 48.0 x 17.7 mm).

known only from a few specimens. The original description reads:

"Shell of medium size; elongate, spindle-shaped, the spire being a third of the total length of shell; spire whorls, probably eight or nine in number, flat-sided, increasing slowly in size; suture impressed; body whorl slightly convex with constriction three-fourths of whorl-length below suture; shell decorated by many fine ribbon-like spiral ribs".

Measurements (mm)—

length	width
29.0	11.0
40.0	13.9

Holotype of *uvasana*

Grapevine Canyon

Synonymy—

- 1915 *Mitra uvasana* Dickerson, Proc. California Acad. Sci., ser. 4, vol. 5, no. 3, p. 75, pl. 11, figs. 13a, b (mouth of Grapevine Canyon, about 35 miles S. of Bakersfield, Tejon formation, California, U. Eocene; holotype in California Academy of Sciences, no. 358); 1916 Dickerson, Univ. California Publ. Geology, vol. 9, pp. 421, 439, 450; 1925 Anderson & Hanna, Occas. papers California Acad. Sci., vol. 11, p. 78.

***Mitra conquisita* Conrad, 1848**

(Pl. 325, fig. 2)

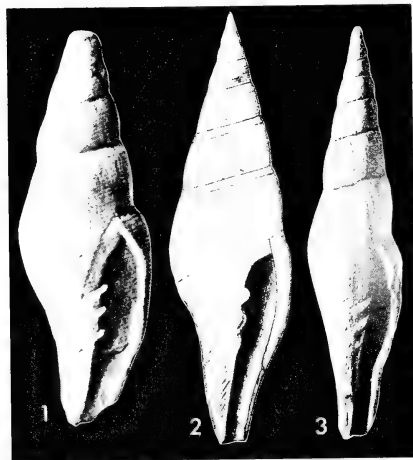


Plate 325. Early Tertiary *Fusimitra*.

Fig. 1. *Mitra (Fusimitra) uvasana* Dickerson from Grapevine Canyon, Tejon formation, U. Eocene of California (from Anderson & Hanna, 1925, pl. 10, fig. 6; 40.0 x 13.9 mm).

Fig. 2. *M. (F.) conquisita* Conrad. Lectotype from Vicksburg, M. Oligocene of Mississippi (from Harris & Palmer, 1947, pl. 55, fig. 8; 31.5 mm).

Fig. 3. *M. (F.) neta* Gardner from Smithville, Bastrop Cty., M. Eocene of Texas (from Gardner, 1945, pl. 24, fig. 1; 35.0 x 8.0 mm).

Range—Eocene and Oligocene of south and southeast United States.

Remarks—A detailed account of this Eocene-Oligocene forerunner of the Recent *M. swainsonii*, together with descriptions and illustrations of types and sculptural variant, may be found in Harris and Palmer (1947). The species will reach a length of 130 mm (about 5 inches), and while immature specimens are spirally striate, at least near the sutural area, senile individuals are almost smooth.

Synonymy—

- 1848 *Mitra conquisita* Conrad, Proc. Acad. Nat. Sci. Philadelphia, vol. 3, p. 289 (January 1848); 1848, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 1, pt. 2, p. 119, pl. 12, fig. 1 (August 1848) [Vicksburg, Vicksburg formation, Mississippi, M. Oligocene; lectotype in Academy of Natural Sciences, Philadelphia, no. 13462]; 1903 Casey, Proc. Acad. Nat. Sci. Philadelphia, vol. 55, p. 283.
- 1848 *Mitra mississippiensis* Conrad, Proc. Acad. Nat. Sci. Philadelphia, vol. 3, p. 289; 1848, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 1, pt. 2, p. 119, pl. 12, fig. 2 (Vicksburg, Vicksburg formation, Mississippi, M. Oligocene; lectotype in Academy of Natural Sciences, Philadelphia, no. 13460); 1903 Casey, Proc. Acad. Nat. Sci. Philadelphia, vol. 55, p. 283 (synonymized with *M. conquisita*).
- 1854 *Mitra millingtoni* Conrad in Wailes, Rept. Agric. Geol. Mississippi, p. 289, pl. 16, fig. 5 (Marl beds of Jackson, Jackson formation, Mississippi, U. Eocene; lectotype in Academy Natural Sciences, Philadelphia, no. 13203); 1865 Conrad, Americ. Journ. Conchology, vol. 1, p. 25 (synonymized with *M. conquisita*); 1894 Harris, Rept. Geol. Surv. Arkansas for 1892, p. 163; 1896 Vaughn, U.S. Geol. Surv. Bull., no. 142, p. 50; 1903 Casey, Proc. Acad. Nat. Sci. Philadelphia, vol. 55, p. 283.
- 1855 *Mitra (Fusimitra) millingtoni* (sic) Conrad, Proc. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 7, pt. 7, p. 261 (description); 1931 Grant & Gale, Mem. San Diego Soc. Nat. History, vol. 1, p. 636.
- 1865 *Fusimitra conquisita* Conrad, Americ. Journ. Conchology, vol. 1, p. 25; 1947 Harris & Palmer, Bull. Americ. Paleontology, vol. 30, no. 117, p. 399, pl. 55, figs. 1-9, 11 (figured lectotype) [*M. millingtoni* synonymized with *M. conquisita*].
- 1890 *Mitra subconquisita* de Gregorio, Ann. Géol. & Paléont. Palermo, liv. 7, p. 76, pl. 5, figs. 50, 51 (Claiborne, Alabama, Eocene; type 38.0 mm).
- 1890 *Mitra mississippiensis* (sic) (Conrad), de Gregorio, *ibid.*, p. 76, pl. 5, figs. 52-55.
- 1899 *Mitra (Cancilla) millingtoni* Conrad, Cossmann, Essai paléonc. comparée, vol. 3, p. 158.
- 1937 *Mitra [millingtoni] millingtoni* Conrad, Palmer, Bull. Americ. Paleontology, vol. 7, no. 32, p. 404.
- 1945 *Mitra (Fusimitra) millingtoni* Conrad, Gardner, Geol. Soc. America Mem., no. 11, p. 221, pl. 14, fig. 5 (Ciudad Camargo, Tamaulipas, Jackson form., N. Mexico, U. Eocene).
- 1945 *Mitra (Fusimitra) conquisita* Conrad, Gardner, *ibid.*, p. 222 (N.E. Mexico, L. Oligocene [*M. mississippiensis* synonymized with *M. conquisita*]).
- 1947 *Fusimitra mississippiensis* (Conrad), Harris & Palmer, Bull. Americ. Paleontology, vol. 30, no. 117, p. 401, pl. 55, fig. 10 (figured lectotype).
- 1970 *Cancilla (Fusimitra) conquisita millingtoni* (Conrad in Wailes), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 48, pl. 7, fig. 3.

Mitra neta Gardner, 1945

(Pl. 325, fig. 3)

Range—Eocene of Texas.

Remarks—Originally described as a subspecies of *M. polita* (Gabb, 1860), the species is rather closely related to *M. conquisita* and may possibly be only a slender form of that species. The species *M. polita* is a small vexilline *Costellaria* with a lirate aperture, and is not related to *Fusimitra* or *M. neta* Gardner. The dimensions of the type-specimen are length 35.0 mm, width 8.0 mm.

Synonymy—

1945 *Mitra (Fusimitra) neta* Gardner, Geol. Soc. America Mem., no. 11, p. 221, pl. 24, figs. 1, 6 (Smithville, Bastrop County, Texas, M. Eocene; type in the National Museum of Natural History, Washington, No. 497444).

Mitra titan Gabb, 1873

(Pl. 328, figs. 5, 6)

Range—Upper Miocene of Dominica.

Remarks—This large species is an ancestral form of the Recent *M. swainsonii*, and in size and sculpture bears a greater resemblance to the eastern Pacific *M. swainsonii swainsonii* than the Caribbean subspecies *M. swainsonii antillensis*. The incomplete type measures 106.3 mm, and when complete, would have reached a length of 140–150 mm.

Measurements (mm)—

length	width	
06.3+	43.0	Holotype of <i>titan</i>
51.2	13.8	Holotype of <i>symmetrica</i>

Synonymy—

- 1873 *Mitra titan* Gabb, Trans. Americ. Philos. Society, vol. 15, p. 220 (Santo Domingo, Dominica, U. Miocene; holotype in Academy of Natural Sciences, Philadelphia, no. 3261; 1917 Maury, Bull. Americ. Paleontology, vol. 5, no. 29, p. 75, pl. 11, figs. 14, 14a; 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 340, pl. 24, fig. 2 (figured holotype)).
- 1873 *Mitra symmetrica* Gabb, Trans. Americ. Philos. Society, vol. 15, p. 220 (Santo Domingo, Dominica, U. Miocene; holotype in Academy of Natural Sciences, Philadelphia, no. 3260; 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 340, pl. 24, fig. 1 (figured holotype) [placed in synonymy of *M. titan*]).
- 1917 *Mitra symmetricus* (sic) Gabb, Maury, Bull. Americ. Paleontology, vol. 5, no. 29, p. 75 ("may be the young of *titan*").

**Mitra swainsonii subspecies
swainsonii Broderip, 1836**

(Color pl. 256, fig. 4; pl. 326, figs. 1–3)

Range—West coast of Baja California, Mexico, to Ecuador.

Remarks—The species appears to have a comparatively restricted distribution, but future col-

lecting on the west coast of South America may extend its range farther south. Ancestral forms of *M. swainsonii* have been recorded from Miocene deposits of Peru, Colombia, Venezuela and Costa Rica. According to Hanna & Hertlein (1935), a living specimen was kept in an unfired small aquarium for 22 months before it died.

Habitat—Sublittoral, from 3 to 71 fathoms.

Description—Shell reaching 135 mm (about 5½ inches) in length, heavy and solid, elongate-fusiform, sutures distinct and simple. Whorls 7–9, apart from the protoconch, spire whorls convex

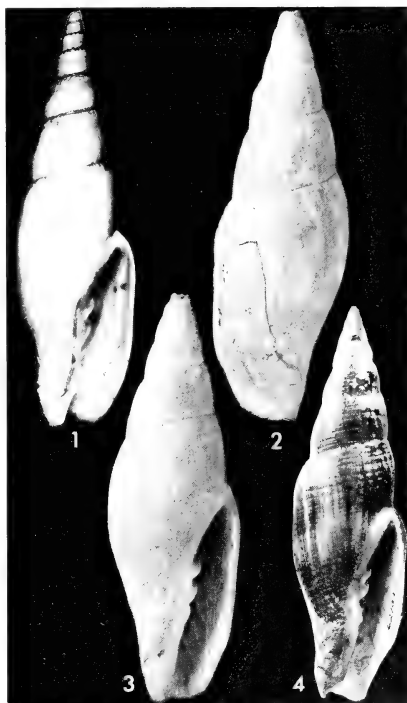


Plate 326. *Mitra (Fusimitra) swainsonii swainsonii* Broderip (Figs. 1–3) *M. (F.) swainsonii antillensis* Dall (Fig. 4).

Fig. 1. Holotype of *M. swainsonii swainsonii* Broderip from Monte Cristi, Ecuador (BM (NH) 1966244; 85.3 x 25.7 mm).

Figs. 2, 3. Holotype of *M. mexicana* (Dall) from off Guaymas, Mexico, 71 fms. (USNM 274124; 71.8 x 23.1 mm) [photo courtesy of H. A. Rehder, USNM].

Fig. 4. Holotype of *M. swainsonii antillensis* Dall from 36 mi. S.E. of Cape Lookout, Nth. Carolina, 168 fms. (USNM 62103; 81.0 x 23.0 mm). [photo courtesy of H. A. Rehder, USNM].

but occasionally slightly shouldered near sutures. Almost smooth in appearance, sculptured with spiral striae or threads which are usually confined to the area near the sutures, and fine axial striae which are more pronounced on the spire whorls. The sutural spiral threads number from 3-9, and on the remainder of the whorls spiral striae may be obsoletely indicated; under magnification, numerous, slightly wavy and granulose, macroscopic spirals are visible in specimens with the periostracum intact. Aperture slightly shorter or longer than the spire, moderately narrow and smooth within; outer lip moderately thickened, simple and distinctly angulate. Columella caloused, weakly "S"-shaped and with 4-5 moderately wide-spaced, oblique folds, anterior 2 folds weak; siphonal notch prominent, siphonal fasciole twisted and slightly recurved towards the dorsum, lower third of body whorl with up to 25 oblique cords. With the periostracum intact, the shell is olive-black, but underneath is uniformly cream in colour; the aperture and columella are porcellaneous-white, edge of columellar callus sometimes with a light brown tinge.

Measurements (mm)—

length	width	height of aperture	
135.0	35.0	60.0	Perlas Ids., Panama
130.0	34.0	—	Holotype of <i>zaca</i> Strong, Hanna & Hertlein

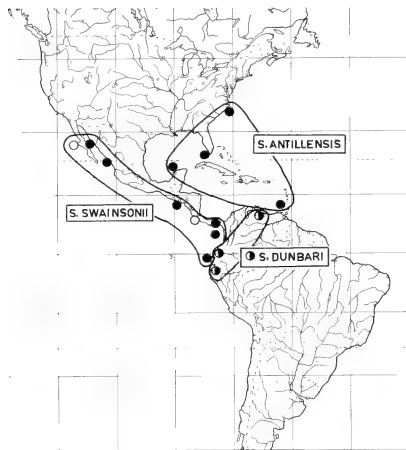


Plate 327. Geographical distribution of *Mitra* (*Fusimitra*) *swainsonii* *swainsonii* Broderip, and its subspecies *M. (F.) swainsonii antillensis* Dall, and the fossil *M. (F.) swainsonii dunbari* Olsson.

119.0	33.0	57.0	Off Mazatlan, W. Mexico
85.3	25.7	41.2	Holotype of <i>swainsonii</i> Broderip
79.0	23.4	37.6	Off Guaymas, W. Mexico
71.8	23.1	38.6	Holotype of <i>mexicana</i> Dall

Synonymy—

- 1836 *Mitra swainsonii* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Monte Christi, W. Colombia); 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 1, fig. 4; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 5, pl. 7, fig. 88; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 121, pl. 36, fig. 68; 1947 Miller, *Min. Conch. Club California*, no. 68, p. 14.
1919 *Strigatella (Atrimitra) mexicana* Dall, Proc. U.S. Nat. Museum, vol. 56, p. 309 (off Guaymas, Mexico, 71 fathoms).
1933 *Mitra zaca* Strong, Hanna & Hertlein, Proc. California Acad. Sci., vol. 21, pt. 10, p. 120, pl. 5, fig. 10 (Santa Maria Bay, Lower California, 6½-14 fathoms); 1935 Hanna & Hertlein, *Nautilus*, vol. 48, no. 3, p. 90; 1967 J. Cate, Veliger, vol. 10, p. 193, pl. 19, fig. 3 (shell), textfig. 3 (radula).
1941 *Mitra (Mitridia) swainsonii* Broderip, Pilsbry & Olsson, Proc. Acad. Nat. Sci. Philadelphia, vol. 93, p. 27 (Punta Blanca, Canoa formation, western Ecuador, Pliocene).
1958 *Mitra (Strigatella) mexicana* Dall, Keen, Sea shells trop. W. America, p. 429, fig. 655.
1958 *Mitra (Strigatella) zaca* Strong, Hanna & Hertlein, Keen, *ibid.*, p. 430, fig. 657.
1964 *Mitra (Atrimitra) mexicana (pars)* Dall, Olsson, Paleont. Research Inst. Ithaca Publ., p. 132, pl. 23, fig. 12 only (Neogene of Ecuador).
1971 *Mitra (Atrimitra) swainsonii* Broderip, Keen, Sea shells trop. W. America, ed. 2, p. 640, fig. 1421 (figured holotype of *M. zaca*).

Types—The holotype of *M. swainsonii* Broderip, is in the British Museum (NH) no. 1966244; Swainson's given dimensions for the length, i.e. 6 pollex = 152.4 mm is an error, but his indication of the width, i.e. 1 pollex = 25.4 mm is correct. The holotype of *M. zaca* Strong, Hanna & Hertlein, is in the California Academy of Sciences, no. 6061. The holotype of *M. mexicana* (Dall), a very worn, faded and small individual, is in the National Museum of Natural History, Washington, no. 274124. The type locality of *M. swainsonii* is Monte Christi, West Colombia (= Monte Cristi, Ecuador).

Nomenclature—*Mitra zaca* has been proposed as a new species because it differed from *M. swainsonii* in being black in colour instead of olive-brown, had 5 columellar folds instead of 4, and lacked the spiral lines at the shoulder. The holotype of *M. swainsonii* is cream in colour and devoid of a periostracum and is as smooth as the holotype of *M. zaca*; the species has either 4 or 5 folds and the spiral sculpture anteriorly to the suture is either obsolete, especially in large mature specimens, or moderately distinct. Olsson's (1964) figure 12 is a small and young specimen of *M. swainsonii* from the Late Neogene of Ecuador, but the specimen depicted in his figure 12a, ap-

pears to belong to the *M. orientalis* group of species.

Records—BAJA CALIFORNIA: Santa Maria Bay, 6½-14 faths. (type-locality of *M. zaca*). WEST MEXICO: off Guaymas, Sonora (DMNH; Cernohorsky coll.); Morro Colorado, Sonora (DMNH; off Mazatlan (USNM; Powell coll.)). COSTA RICA: Tambor (Miller, 1947). EL SALVADOR: Acajutla (USNM). PANAMA: Venado Island, Bay of Panama (USNM); Perlas Is. (DMNH). ECUADOR: Monte Cristi (type-locality).

Fossil records—ECUADOR: Punta Blanca, Canoa formation; Pliocene (Pilsbry & Olson, 1941); Punta Gorda, Esmeraldas formation; Late Neogene (Olsson, 1964).

Mitra swainsonii subspecies
antillensis Dall, 1889

(Pl. 326, fig. 4)

Range—North Carolina to Yucatan and the Antilles.

Remarks—The Caribbean analogue of the west American *M. swainsonii* differs from the nominate species only in features of sculpture. The spiral grooves are distinct and deeper, and produce 9 flat spiral cords on the penultimate and 24 cords on the body whorl in the holotype; the columella has

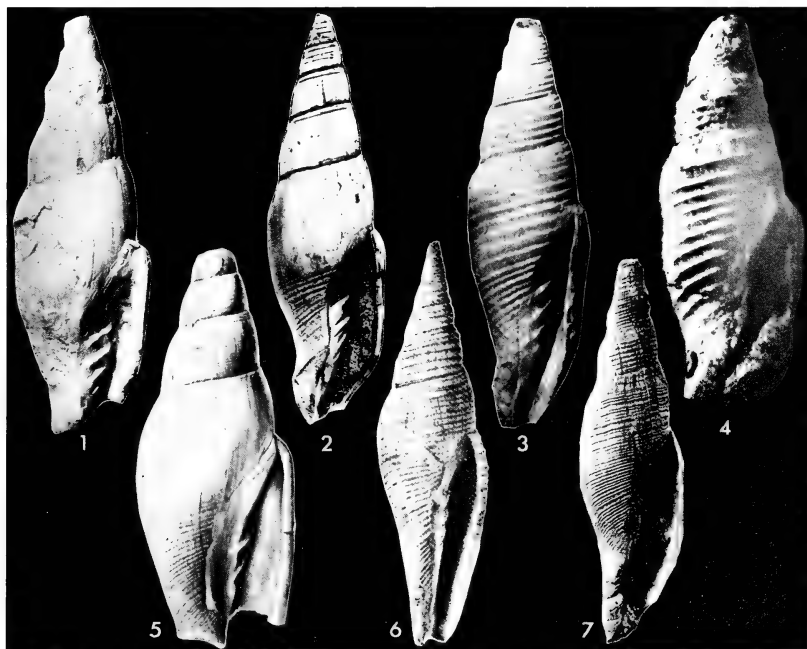


Plate 328. Figs. 1-2. *Mitra (Fusimitra) swainsonii dunbari* Olsson Figs. 3-4. *M. (F.) limonensis* Olsson Figs. 5-6. *M. (F.) titan* Gabb Fig. 7. *M. (F.) sieversi* Rutch.

Fig. 1. Holotype of *M. (F.) swainsonii dunbari* Olsson from Quebrada Tucillal at Zorritos, Tumbes formation, U. Miocene of Peru (from Olsson, 1932, pl. 16, fig. 2; 97.0 x 34.0 mm).

Fig. 2. Holotype of *M. woodringi* Olsson from between Mompiche and Portete, L. Miocene of Ecuador (from Olsson, 1964, pl. 23, fig. 9; 80.2 x 23.8 mm).

Fig. 3. Holotype of *M. (F.) limonensis* Olsson from Port Limon, Gatun stage, U. Miocene of Costa Rica (from Olsson, 1922, pl. 6, fig. 1; 74.0 x 23.0 mm).

Fig. 4. Holotype of *M. sanctifrancisci* Maury from Springvale, U. Miocene of Trinidad (from Maury, 1925, pl. 35, fig. 13; 65.0 x 20.0 mm).

Fig. 5. Holotype of *M. (F.) titan* Gabb from Santo Domingo, U. Miocene of the Dominican Republic (from Pilsbry, 1922, pl. 24, fig. 2; 106.3 x 43.0 mm).

Fig. 6. Holotype of *M. symmetrica* Gabb from Santo Domingo, U. Miocene of the Dominican Republic; juvenile specimen (from Pilsbry, 1922, pl. 24, fig. 1; 51.2 x 13.8 mm).

Fig. 7. Type-figure of *M. (F.) sieversi* Rutch from Punta Gavilan, U. Miocene of Nth. Venezuela; juvenile specimen (from Rutch, 1934, pl. 6, fig. 8; 95.0 x 26.0 mm).

5 folds and a very small sixth fold anteriorly. The longitudinal sculpture is also more prominent, particularly around the sutural area. The Caribbean subspecies appears to live in appreciably deeper depth than the nominate subspecies.

Habitat—Sublittoral, in sandy and grey mud and a coral bottom, from 130 to 421 fathoms.

Measurements (mm)—

length	width	height of aperture	
81.0	23.0	40.0	Holotype of <i>antillensis</i>

Synonymy—

1889 *Mitra swainsonii* var. *antillensis* Dall, Bull. Mus. Comp. Zool. Harvard, vol. 18, p. 158, pl. 38, fig. 7 (off Grenada, Antilles; North Carolina; Yucatan); 1889, U.S. Nat. Mus. Bull., no. 37, p. 110, pl. 38, fig. 7; 1890, Trans. Wagner Free Inst. Sci., vol. 3, p. 94; 1968 Boss, Rosewater & Ruhoff, U.S. Nat. Mus. Bull., no. 287, p. 29.

1954 *Mitra swainsonii antillensis* Dall, Abbott, American Seashells, p. 248.

Types—The holotype and paratype of *M. swainsonii antillensis* Dall, are in the National Museum of Natural History, Washington, no. 62103. Dall originally cited 3 localities, but the selected holotype came from "36 miles S.E. of Cape Lookout, North Carolina, 168 fathoms", which is here accepted as the type locality.

Records—NORTH CAROLINA: 36 mi. S.E. of Cape Lookout, 168 faths. (type-locality). FLORIDA: S.W. of Cosgrove Shoals, Key West, 100 faths. (D. Steger, DMNH). YUCATAN: off Arrowsmith Bank, 130 faths. (USNM). ANTILLES: off Grenada, 421 faths. (USNM; MCZ).

***Mitra swainsonii* subspecies
dunbari Olsson, 1932**

(Pl. 328, figs. 1, 2)

Range—Miocene of Peru, Ecuador, Colombia, and Venezuela.

Remarks—The author compared his species to *M. titan* and *M. swainsonii*, but considered the latter species to have coarser sculpture. The sculpture of some individuals of *M. swainsonii* is as discreet as in *M. dunbari* or as distinct as in the form *woodringi*. The species is very close to *M. swainsonii swainsonii* and has been retained as a subspecies because of separation in time. No attempt is made to propose a substitute name for the pre-occupied *M. woodringi* Olsson, which is considered to be conspecific with *M. dunbari*.

Measurements (mm)—

length	width	height of aperture	
97.0	34.0	46.0	Holotype of <i>dunbari</i>
80.2	23.8	—	Holotype of <i>woodringi</i>
66.0	22.0	—	Punta Gavilan, Venezuela

Synonymy—

1932 *Mitra (Mitra) dunbari* Olsson, Bull. Americ. Paleontology, vol. 19, no. 68, p. 166, pl. 16, fig. 2 (Quebrada Tucillal at Zorritos, Tumbes formation, Peru; U. Miocene).

1934 *Mitra* (? *Mitraria*) aff. *swainsonii* Broderip, Rutch, Abh. Schweiz. Palaeont. Gesell., vols. 54 & 55, p. 86, pl. 7, fig. 5 (Punta Gavilan, Sabanas Altas, Venezuela; U. Miocene).

1964 *Mitra woodringi* Olsson, Neogene mollusks N.W. Ecuador, Paleont. Res. Inst. Ithaca Publ., p. 131, pl. 23, fig. 9 (Between Mompiche and Portete, N. Manabi Province, Ecuador, L. Miocene; holotype in National Museum of Natural History, Washington, no. 643948 [non *Mitra (Tiara) woodringi* Vokes, 1938]).

***Mitra limonensis* Olsson, 1922**

(Pl. 328, figs. 3, 4)

Range—Miocene of Costa Rica, Panama, Colombia, Venezuela and Trinidad.

Remarks—Olsson's type-figure shows a species which closely resembles in form and sculpture the living Caribbean *M. swainsonii antillensis* Dall. The specimens figured by Rutch (1934) and Woodring (1964) from the Miocene of Venezuela and Panama respectively, are more slender, with more convex whorls and a more prominent spiral and axial sculpture, and reminiscent of *Cancilla* rather than *Mitra*; they may be immature specimens of *M. limonensis*. According to Maury (1925), *M. sanctifrancisci* differs from *M. limonensis* by having an extra spiral on the ante- and penultimate whorls, with sutures less excavated and the constriction not nearly so marked. These are all variable characters in most *Mitra* species and within the variational range of the *swainsonii* species complex.

Measurements (mm)—

length	width	
74.0	23.0	Holotype of <i>limonensis</i>
65.0	20.0	Holotype of <i>sanctifrancisci</i>

Synonymy—

1922 *Mitra swainsoni* var. *limonensis* Olsson, Bull. Americ. Paleontology, vol. 9, p. 272, pl. 6, fig. 1 (Port Limon, Gatun stage, Costa Rica, Late Miocene; holotype in the Paleontological Research Institution, Ithaca, no. 20959).

1925 *Mitra sanctifrancisci* Maury, Bull. Americ. Paleontology, vol. 10, no. 42, p. 204, pl. 35, fig. 13 (Springvale, Springvale formation, Trinidad, U. Miocene; holotype in Paleontological Research Institution, Ithaca, no. 1051).

1934 *Mitra* (? *Mitraria*) cf. *swainsonii* limonensis Olsson, Rutch, Abh. Schweiz. Palaeont. Gesell., vols. 54 & 55, p. 86, pl. 7, fig. 6 (Punta Gavilan, Venezuela; U. Miocene).

1964 *Mitra (Pleiotytna?) limonensis* Olsson, Woodring, U.S. Geol. Surv. Prof. Paper, no. 306-C, p. 282, pl. 46, fig. 1 (Gatun formation, Panama; M. Miocene).

***Mitra sieversi* Rutch, 1934**

(Pl. 328, fig. 7)

Range—Upper Miocene of North Venezuela.

Remarks—The species has the appearance of a *Cancilla*, but the somewhat shouldered whorls and the numerous, confused spiral threads would indicate a close relationship with other spirally sculptured developmental forms of Miocene *Fusimitra* species. Rutsch compared his new species with *M. titan* Gabb, which he considered to be plumper with a more strongly convex body whorl, relatively lower spire whorls which are not shouldered and the obsolescence of a spiral sculpture. The species was further compared with *M. limonensis* Olsson, which has broader spiral cords, lower spire whorls and a less pointed spire. The dimensions of the type-specimen of *M. sieversi* are length 95.0+ mm, width 26.0 mm.

Synonymy—

1934 *Mitra (Tiara) sieversi* Rutsch, Abh. Schweiz. Palaeont. Gesell., vols. 54 & 55, p. 84, pl. 6, figs. 7, 8 (Punta Gavilan, N. Venezuela, U. Miocene; type in Naturhistorisches Museum, Basel, no. 92 [295/1769]).

1970 *Cancilla sieversi* (Rutsch), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 48, pl. 7, fig. 1.

***Mitra berlineri* Maury, 1917**

(Pl. 329)

Range—Miocene of the Dominican Republic.

Remarks—This large species is sculptured with irregular and wavy spiral threads on the spire whorls and narrow, close-set flat cords on the body whorl; there are irregular axial growth-plications

and fine axial striae, the aperture is narrow, the outer lip is thickened and simple, constricted near the commencement, the columella is calloused and has 4 strong, oblique folds. The measurements of the holotype are length 83.0 mm, width 24.0 mm.

Synonymy—

1917 *Mitra berlineri* Maury, Bull. Americ. Paleontology, vol. 5, no. 29, p. 240, pl. 11, figs. 15, 15a (Cercado de Mao, Santo Domingo, Dominican Republic; Miocene).



Plate 329. *Mitra (Fusimitra) berlineri* Maury. Cercado de Mao, Santo Domingo, Miocene of the Dominican Republic (from Maury, 1917, pl. 11, figs. 15, 15a; 83.0 x 24.0 mm).

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

Subgenus *Eumitra* Tate, 1889

Type: *Mitra alokiza* Tenison-Woods, 1880

Shell up to 70 mm (about 3 inches) in length, fusiformly-elongate or fusiformly-ovate, whorls convex or subangulate, protoconch conical. Sculptured with smooth or punctate spiral striae, irregular axial growth-lines and basal cords; spiral striae occasionally confined to the sutural area and the base. Outer lip thin or thick, simple, contracted anteriorly in adult specimens. Aperture generally shorter than the spire, smooth within; columella with 1-5 oblique folds, anterior canal slightly produced, siphonal notch distinct.

Species of *Eumitra* resemble *Mitra* s. str., but differ in the peculiar development of the columellar folds, a character not observed in living *Mitra* species. Juvenile or adult specimens may have up to 5 columellar folds, but generally there is a reduction in the number of columellar folds with maturity. In adult specimens the whorls become frequently subangulate and the columella has 1 prominent fold with a feeble indication of a second anterior fold. *Eumitra* species occur in Lower Miocene to Lower Pliocene deposits of Australia and Lower Miocene deposits of New Zealand.

Synonymy—

- 1889 *Eu-Mitra* Tate, Trans. Roy. Soc. Sth. Australia, vol. 11, p. 135; type-species by subsequent designation, Cotton, 1957: *Mitra alokiza* Tenison-Woods, 1880.
1927 *Diplomitra* Finlay, Trans. New Zealand Inst., vol. 57, pp. 408, 477; type-species by original designation: *Cymbiola nitens* Marshall, 1918.

Australian *Eumitra*

Mitra alokiza Tenison-Woods, 1880

(Pl. 330, fig. 1)

Range—Miocene of Victoria and South Australia.

Remarks—The original description was based on a small and broad juvenile specimen only 11.0 mm in length; fully-grown specimens will reach a length of 70.0 mm.

Synonymy—

- 1880 *Mitra alokiza* Tenison-Woods, Proc. Linn. Soc. New South Wales, vol. 4, p. 9, pl. 2, fig. 12 (Lower beds at Muddy Creek, Victoria, Miocene; type-specimen 11 x 3.5 mm); 1889 Tate, Trans. Proc. Roy. Soc. Sth. Australia, vol. 11, p. 136, pl. 4, fig. 8; 1897 Harris, Cat. Tert. Moll. Brit. Museum, p. 119;

- 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 37, pl. 3, figs. 1, 2.
1970 *Eumitra alokiza* (Tenison-Woods), Darragh, Mem. Nat. Mus. Victoria, vol. 31, p. 153.



Plate 330. Austral.—Neozelanic *Eumitra*.

- Fig. 1. *Mitra (Eumitra) alokiza* Tenison-Woods. Specimen from Altona Bay, coal shaft, Victoria, Miocene of Australia; immature specimen (WABP coll.; 54.6 x 13.0 mm).
Fig. 2. *M. (E.) diductua* Tate. Paratype from Tareena, New South Wales, Miocene of Australia (from Ludbrook, 1958, pl. 4, fig. 3; c. 70.0 mm).
Fig. 3. *M. (E.) uniplica* Tate. Mornington, Victoria, Miocene of Australia (type-figure from Tate 1889, pl. 4, fig. 12; 49.0 x 17.0 mm).
Figs. 4, 5. *M. (E.) nitens* (Marshall). Pakaurangi Point, Kaipara Harbour, L. Miocene of New Zealand; immature specimen (from Marshall, 1918, pl. 18, figs. 6, 6a; 26.0 x 8.0 mm).
Fig. 6. *M. (E.) waitatensis* (Powell and Bartrum). Holotype from Oneroa, Waiheke Id., L. Miocene of New Zealand (AIM TP-3756; 41.0 x 18.6 mm).

***Mitra dictua* Tenison-Woods, 1880**

Range—Miocene of Victoria and Tasmania.

Remarks—The description was based on a small juvenile specimen 12.0 mm in length; the type-figure shows a specimen with latticed sculpture and a narrow, long anterior canal.

Synonymy—

1880 *Mitra dictua* Tenison-Woods, Proc. Linn. Soc. New South Wales, vol. 4, p. 8, pl. 3, fig. 7 (Lower beds at Muddy Creek, Victoria, Miocene; type-specimen 12 x 5.5 mm).

1970 *Eumitra dictua* (Tenison-Woods), Darragh, Mem. Nat. Mus. Victoria, vol. 31, p. 166.

***Mitra diductua* Tate, 1899**

(Pl. 330, fig. 2)

Range—Pliocene of New South Wales and South Australia.

Synonymy—

1889 *Mitra dictua* Tenison-Woods (*pars*), Tate, Trans. Proc. Roy. Soc. Sth. Australia, vol. 11, p. 138, pl. 4, fig. 9 (non Tenison-Woods, 1880).

1899 *Mitra diductua* Tate, Trans. Proc. Roy. Soc. Sth. Australia, vol. 23, p. 107 (Murray Desert = well sinking at Tareena, New South Wales; holotype in University of Adelaide, Sth. Australia, no. T638: 55.0 x 15.6 x 22.0 mm).

1899 *Mitra fodinalis* Tate, *ibid.*, p. 108 (Dry Creek and Croydon bores near Adelaide, Sth. Australia, L. Pliocene; type in University of Adelaide, Sth. Australia).

1958 *Mitriaria* (*Eumitra*) *diductua* (Tate), Ludbrook, Trans. Roy. Soc. Sth. Australia, vol. 81, p. 72, pl. 4, figs. 3, 6 (figured type-specimens).

1970 *Eumitra diductua* (Tate), Darragh, Mem. Nat. Mus. Victoria, vol. 31, p. 166.

***Mitra uniplica* Tate, 1889**

(Pl. 330, fig. 3)

Range—Miocene of Victoria.

Remarks—Finlay's substitute name is superfluous as *M. uniplica* Tate is not a homonym of *M. ebenus* var. *uniplicatus* S. V. Wood, 1872.

Synonymy—

1889 *Mitra uniplica* Tate, Trans. Proc. Roy. Soc. Sth. Australia, vol. 11, p. 138, pl. 4, fig. 12 (Blue clays at Schnapper Point = Mornington, Victoria, Miocene).

1897 *Mitra uniplicata* (*sic*) Tate, Harris, Cat. Tert. Moll. Brit. Museum, p. 122 (Muddy Creek, Victoria, Miocene).

1927 *Mitra monoploca* Finlay, Trans. Proc. New Zealand Inst., vol. 57, p. 509 (substitute name for *M. uniplica* Tate, 1889).

1970 *Diplomitra uniplica* (Tate), Darragh, Mem. Nat. Mus. Victoria, vol. 31, p. 204.

***Mitra nitens* (Marshall, 1918)**

(Pl. 330, figs. 4, 5)

Range—Lower Miocene of New Zealand.

Remarks—*Mitra nitens* (Marshall), although slightly larger, is a less mature individual with less convex whorls, more numerous spiral striae and only a weakly calloused columella. In mature specimens, the whorls become subangulate at the suture, the sculpture less prominent and columella more calloused.

Synonymy—

1918 *Cymbiola masefieldi* Marshall, Trans. Proc. New Zealand Inst., vol. 50, p. 266, pl. 18, figs. 12, 12a (Pakaurangi Point, Kaipara Harbour, New Zealand, L. Miocene; type-specimen in Wanganui Museum: 21 x 8 mm).

1918 *Cymbiola nitens* Marshall, *ibid.*, p. 266, pl. 8, figs. 6, 6a (Pakaurangi Point, Kaipara Harbour, New Zealand, L., Miocene; type-specimen in Wanganui Museum: 26 x 8 mm).

1927 *Diplomitra nitens* (Marshall), Finlay, Trans. Proc. New Zealand Inst., vol. 57, p. 408; 1966 Fleming, New Zealand Dept. Sci. Ind. Res. Bull., no. 173, p. 64.

1970 *Mitra* (*Eumitra*) *nitens* (Marshall), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 37, pl. 3, fig. 4.

Records—NEW ZEALAND: Mouth of Waioikomoko Creek, Parengarenga Harbour, L. Miocene (DGUA); Fekere, Parengarenga Harbour, fine sandstone, L. Miocene (DGUA); Pakaurangi Point, Kaipara Harbour, L. Miocene (type-locality).

***Mitra calcar* (Marshall, 1918)**

Range—Lower Miocene of New Zealand.

Remarks—The description was based on a small juvenile specimen 9.0 mm in length, which is most probably a young *M. masefieldi* (Marshall).

Synonymy—

1918 *Cymbiola calcar* Marshall, Trans. Proc. New Zealand Inst., vol. 50, p. 266, pl. 18, figs. 7, 7a (Pakaurangi Point, Kaipara Harbour, New Zealand, L. Miocene; type in Wanganui Museum: 9 x 4 mm).

***Mitra waitemataensis* (Powell & Bartrum, 1929)**

(Pl. 330, fig. 6)

Range—Lower Miocene of New Zealand.

Remarks—The holotype is a moderately large and mature specimen which is very similar, if not conspecific, with *M. masefieldi* (Marshall).

Synonymy—

1929 *Diplomitra waitemataensis* Powell & Bartrum, Trans. Proc. New Zealand Inst., vol. 60, p. 429, pl. 34, figs. 3, 4 (Oneroa, Waiheke Island, L. Miocene; holotype in Auckland Institute & Museum, Powell coll., no. TP-3756: 41.0 x 18.6 mm).

1970 *Mitra* (*Eumitra*) *waitemataensis* (Powell & Bartrum), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 37, pl. 3, fig. 5 (figured holotype).

Subgenus *Nebularia* Swainson, 1840

Type: *Mitra contracta* Swainson, 1820

Shell up to 60 mm (about 2½ inches) in length, biconic, roundly-ovate to elongate-ovate, solid. Protoconch conical, sutures simple or coronate, deep or shallow. Sculptured with spiral cords or striae, interspaces smooth or axially striate. Outer lip simple or crenulate, thickened, convex or contracted; aperture narrow, always smooth within. Columella with 3-6 prominent, oblique folds, anterior canal short or produced; siphonal notch generally distinct. Periostracum thin and moderately opaque.

The radula and living animal pattern are the same as in *Mitra* s. str. *Nebularia* species are almost exclusively rock and coral dwellers and are mainly confined to reef-flats of the intertidal zone. *Nebularia* is not a natural and well-defined group, as some characters tend to intergrade with *Mitra* s. str., but is a convenient group-term for the spirally corded, rock-dwelling *Mitra* species.

Synonymy—

- 1840 *Nebularia* Swainson, Treat. Malacology, pp. 130, 131, 319; type-species by subsequent designation, Herrmannsen, 1847: *Mitra contracta* Swainson, 1820.
1853 *Chrysame* H. & A. Adams, Gen. Recent Mollusca, vol. 1, p. 171; type-species by subsequent designation, Cox, 1927: *Mitra coronata* Lamarck, 1811.

Mitra contracta Swainson, 1820

(Color pl. 256, fig. 7; pl. 331, figs. 1-7)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—The species is variable in form and sculpture, some individuals being slender and elongate, with telescopic whorls; others are broader and more inflated and approach in form *M. chrysostoma* Broderip; the spiral threads are few or numerous and frequently obsolete on the centre of the body whorl.

Habitat—On reefs, under coral, from the intertidal zone to a depth of 15 fathoms.

Description—Shell up to 50 mm (2 inches) in length, fusiformly-elongate to fusiformly-ovate, solid, sutures distinct, smooth and usually narrowly ledged without being channeled. Whorls 8-10, apart from a worn conical protoconch, first 2-3 post-nuclear whorls sculptured with 4 or 5 finely incised and minutely punctate spiral grooves, grooves becoming deeper on the last 3 whorls and produce feebly elevated spiral cords; cords number from 5-19 on the penultimate and from 25-45 on the body whorl. The punctate grooves become smooth on the last 3 whorls and the pittings are replaced by numerous, fine longitudinal hairlines; the spiral threads become frequently obsolete on the centre of the body whorl. Aperture narrow, equal in height or shorter than the spire, smooth within; outer lip thickened, smooth and occasionally slightly reflected, columella glazed and with 4-6 oblique folds. Siphonal fasciole straight or twisted, siphonal notch distinct. White to creamy-white in colour, ornamented with irregular axial or "L"-shaped, dark reddish brown blotches which occasionally merge on the body whorl and form 2 irregular transverse zones; aperture and columellar folds cream, golden-yellow or orange in colour. Periostracum dark brown, thin, but moderately opaque.

Measurements (mm)—

length	width	height of aperture	
43.3	—	—	Lectotype of <i>abbatis</i>
43.4	13.4	20.8	Boac I., Philippines
36.6	12.7	18.5	Luzon, Philippines
31.9	12.0	15.4	Holotype of <i>nebulosa</i>
30.5	13.1	18.4	Lectotype of <i>barclayi</i>
27.8	9.0	15.9	off Makua, Hawaiian Ids.

Synonymy—

- 1795 "*Voluta Mitra abbatis*" Chemnitz, Syst. Conchylien-Cabinet, vol. 11, p. 19, pl. 177, figs. 1709, 1710 (*non binomial*).
1811 *Mitra ferruginea* var. B. Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 200 (refers to Chemnitz, *op. cit.*, figs. 1709, 1710) [non *M. ferruginea* Lamarck, 1811].
1817 *Voluta abbatis* Dillwyn, Descr. cat. Recent shells, vol. 1, p. 557 (refers to Chemnitz, *op. cit.*, figs. 1709, 1710 [East Indian Seas]) [non *Mitra abbatis* Perry, 1811].
1820 *Mitra contracta* Swainson, Zoological Illustrations, ser. 1, vol. 1, pl. 18, top and bottom figures (no locality given); 1882 Tryon, Manual of Conchology, vol. 4, p. 120, pl. 35, fig. 53.
1836 *Mitra nebulosa* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Anaa Island, Tuamotus); 1861 Dohrn, Malakozool. Blatter, vol. 8, p. 134; 1906 E. A. Smith, Proc. Malac. Soc. London, vol. 7, p. 125.
1839 *Mitra abbatis* Anton, Verz. Conchylien, p. 67; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 13, fig. 91; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 14, fig. 226; 1880 Garrett, Journal of Conchology, vol. 3, p. 12.
1844 *Mitra infecta* Reeve, Conchologia Iconica, vol. 2, pl. 11, fig. 75 (Anaa Island, Tuamotus); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 27, fig. 607.

1874 *Mitra barclayi* "Hanley", Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 14, fig. 225 and pl. 27, fig. 612 (Flacq, Mauritius and Anaa, Pacific).

1935 *Mitra (Nebularia) abbatis* var. *contracta* Swainson, Dautzenberg, Mém. Mus. d'Hist. Nat. Belg., vol. 2, p. 63.

1964 *Mitra* sp. (close to *abbatis* Dillwyn), Weaver, Hawaiian Shell News, vol. 12, no. 10, p. 1, figs. 1, 2.

1970 *Mitra (Nebularia) contracta* Swainson, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 68, pl. 2, fig. 6.

Types—The specimen figured by Chemnitz, 1795, in figures 1709, 1710, is in the Zoological Museum, Copenhagen; it is here designated as the lectotype of *M. abbatis* (Dillwyn). The whereabouts of the type-specimen of *M. contracta*, which originally was in Humphrey's collection, are unknown; the specimen figured by Swainson, 1820, on plate 18 (see synonymy) is designated as the lectotype of *M. contracta* Swainson. The holotype of *M. nebulosa* Broderip, which is also the holotype of *M. infecta* Reeve, is in the British Museum (NH) no. 1967820. The specimen of *M. barclayi* Sowerby, figured by the author on plate 14, fig. 225 from Anaa Island, Tuamotus, ex-Hanley collection, is in the British Museum (NH) no. 1900, 3.19.41, and is here designated as the lectotype of *M. barclayi*; the protoconch is now missing. The specimen illustrated by Sowerby on plate 27, fig. 612, from Mauritius, is in the National Museum of Wales, Cardiff, dimensions 34.4 x 13.9 x 18.7 mm, with the number 872 written inside the aperture. Anaa Island, Tuamotu Islands, is designated as the type locality of *M. contracta*.

Nomenclature—The names *M. abbatis* and *M. contracta* have been erroneously applied to the species *M. ustulata* Reeve, by Hitachi (1969) and Cernohorsky (1965). The species *M. contracta* is

very closely related to *M. chrysostoma* Broderip, and only superficially resembles *M. ustulata*.

Records—EAST AFRICA: Inhaca Island, Lorenzo Marques, Mozambique (van Hoepen coll.). MAURITIUS: Flacq (NMW). INDONESIA: Tjilaoet-Eureun (Dautzenberg, 1935). PHILIPPINE ISLANDS: Luzon (NMW); Matnog, Luzon (BMNH); Boac, Marinduque (Clover coll.; Cernohorsky coll.); Samar I. (DMNH); Caba I., Lubang I., Mindoro (USNM; MCZ). RYUKYU ISLANDS: S. Kunigami-Gun, Okinawa (USNM). NEW GUINEA: Biak I., Schouten I. (USNM). NEW BRITAIN: Nordup village, Rabaul (McCollim coll.). NEW HEBRIDES: Efate Island (Allan coll.); Teuma Bay, S. Efate I. (AIM). FIJI ISLANDS: Cakaudrove coast, Vanua Levu (Browne coll.). SOCIETY ISLANDS: Huahine (Garrett, 1880). TUAMOTU ISLANDS: Anaa Island (BMNH). HAWAIIAN ISLANDS: Kewalo, Honolulu (AIM); off Makua, Oahu, 7 faths. (Clover coll.); off Rabbit I., Oahu, 6 faths. (DMNH).

Mitra coarctata Reeve, 1844

(Color pl. 256, fig. 8; pl. 331, figs. 11-13)

Range—Philippine Islands to Polynesia and Micronesia.

Remarks—This rare species has the appearance of a miniature *M. chrysostoma* Broderip, with the finer and more discreet sculpture of *M. contracta* Swainson. The actual geographical range is probably more extensive than is evident from available records.

Habitat—Unknown, but probably a reef-dweller.

Description—Shell up to 23 mm (about 1 inch) in length, elongate-ovate and solid, top of the spire frequently concave, sutures distinct and minutely ledged without being channeled. Whorls 6-7, apart from a worn protoconch, spire whorls flat-sided or slightly convex, sculptured with fine and shallow spiral striae which number from 6-12 on the penultimate and from 25-35 on the body

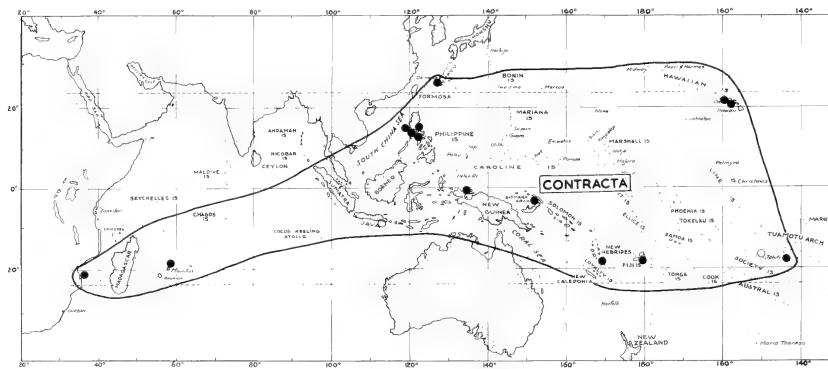


Plate 330a. Geographical distribution of *Mitra (Nebularia) contracta* Swainson.

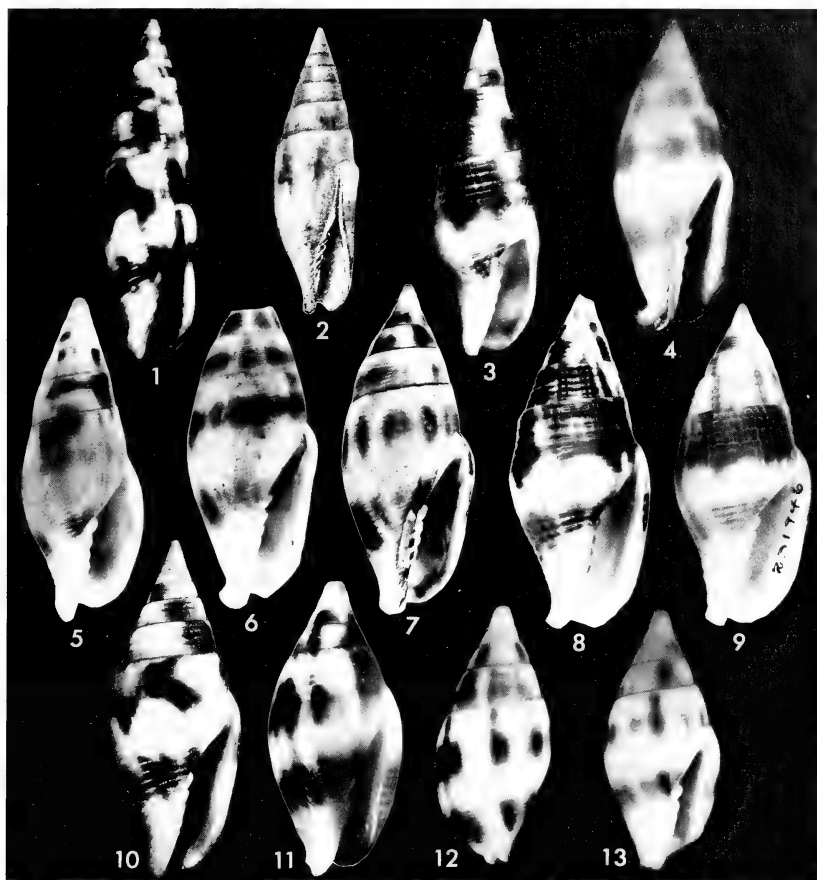


Plate 331. Figs. 1-7. *Mitra (Nebularia) contracta* Swainson Figs. 8-10. *M. (N.) chrysostoma* Broderip Figs. 11-13. *M. (N.) coarctata* Reeve.

Fig. 1. Lectotype of *Voluta abbatis* Dillwyn; slender form (ZMC; 43.5 mm) [colour slide courtesy of R. Tucker Abbott, DMNH].

Fig. 2. Lectotype figure of *M. contracta* Swainson (from Swainson, 1820, pl. 18).

Fig. 3. Specimen from off Makua, Oahu, Hawaiian Ids., 7 fms. (Clover coll.; 27.8 x 9.0 mm).

Fig. 4. Specimen from S.W. Inhaca Id., Mozambique, East Africa; broad form (van Hoepen coll.; 29.4 x 11.0 mm).

Fig. 5. Holotype of *M. nebulosa* Broderip from Anaa Id., Tuamotu Archipelago (BM (NH) 1967820; 31.9 x 12.0 mm).

Fig. 6. Lectotype of *M. barclayi* Sowerby from Anaa Id.,

Tuamotu Archipelago; broad form (BM (NH) 1900.3.19.41; 30.5+ x 13.1 mm).

Fig. 7. Syntype of *M. barclayi* Sowerby from Mauritius (NMW; 34.4 x 13.9 mm).

Fig. 8. Lectotype of *M. (N.) chrysostoma* Broderip from Anaa Id., Tuamotu Archipelago (BM (NH) 1967715; 51.4 x 21.8 mm).

Fig. 9. Holotype of *M. arnaldi* Bartsch from Davao, Mindanao, Philippine Ids. (USNM 231946; 35.5 x 15.0 mm).

Fig. 10. Specimen of *M. (N.) chrysostoma* Broderip from Jaluit Atoll, Marshall Ids. (USNM 659595; 28.0 x 11.0 mm).

Fig. 11. Lectotype of *M. (N.) coarctata* Reeve from Anaa Id., Tuamotu Archipelago (BM (NH) 1967722; 21.8 x 11.4 mm).

Figs. 12, 13. Specimen from Rarotonga, Cook Ids. (WOC coll.; 18.0 x 8.0 mm).

coarser and fewer in number, and usually number from 4-9 on the penultimate whorl. The sculpture also becomes obsolete on the dorsal side of the body whorl, and in some specimens the siphonal fasciole has the same twist as *M. contracta*. Although the outer lip is also smooth in *M. chrysostoma*, in individuals which are prominently corded at the base, a few obsolete and calloused undulations may appear anteriorly. In features of exterior and interior colouring, formation of sutures, number of whorls and columellar folds, the two species do not differ.

Habitat—On reefs, under coral, from the intertidal zone to a depth of 5 fathoms.

Measurements (mm)—

length	width	height of aperture	
51.4	21.8	29.0	Lectotype of <i>chrysostoma</i>
40.0	17.8	25.0	Mulinuu, Samoa I.
35.5	15.0	20.0	Holotype of <i>arnaloti</i>
32.0	14.2	20.0	Vanua Levu, Fiji I.
17.0	—	—	Tom's Island, Cook I.

Synonymy—

- 1836 *Mitra chrysostoma* Broderip, Proc. Zool. Soc. London, pt. 3, p. 194 (Anaa Island, Tuamotus); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 2, fig. 12; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 8, figs. 95*, 96*; 1965 Cernohorsky, Veliger, vol. 8, p. 83, pl. 14, fig. 18.
 1838 *Mitra contracta* Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 24, pl. 9, fig. 25 (non Swainson, 1820).
 1850 *Mitra kieneri* Philippi, Zeit. Malakozoologie, vol. 7, no. 1, p. 22 (substitute name for *M. contracta* Kiener, 1838).
 1882 *Mitra (Strigatella) chrysostoma* Swainson, Tryon, Manual Conchology, vol. 4, p. 155, pl. 46, figs. 330, 331.
 1918 *Mitra arnaloti* Bartsch, Proc. Biol. Soc. Washington, vol. 31, p. 184 (Davao, Mindanao, Philippine I.).
 1935 *Strigatella chrysostoma* Swainson, Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 101 (extended synonymy).
 1960 *Mitra (Nebularia) aff. M. (N.) chrysostoma* Broderip, MacNeil, U.S. Geol. Surv. Prof. Paper, no. 339, p. 92, pl. 17, fig. 21 (Pliocene of Okinawa).
 1970 *Mitra (Nebularia) chrysostoma* Broderip, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 68, pl. 2, fig. 7.

Types—The lectotype, here designated, and 2 syntypes of *M. chrysostoma* Broderip, are in the British Museum (NH), no. 1967715. Three syntypes of *M. kieneri* Philippi, are in the Muséum d'Histoire Naturelle, Geneva, and the holotype of *M. arnaloti* Bartsch, is in the National Museum of Natural History, Washington, no. 231946. The type locality is Anaa Island, Tuamotu Islands.

Records—EAST AFRICA: Mogadiscio, Somalia; Porto Amelia, Mozambique (both USNM); MAURITIUS: (USNM). THAILAND: Chance Island; Goh Sindarar Thai (both USNM); Ko Ra Dang Island, near Malayan border (Cernohorsky coll.). INDONESIA: Pulau Penju, S. of Sumatra; Pulau Bai, Batu group, off Sumatra (both USNM); Island off Kampong, N.W. Tajandu I., Kai I. (WAM). PHILIPPINE ISLANDS: La Union Point, Lingayan Gulf, Luzon; Port Tataan,

Tawi Tawi group; Sanga Sanga (DMNH). Point Mantangal, Basilan; Davao, Mindanao (all USNM); Boac, Marinduque (Lumawig coll.); Hundred Islands, Lucap (Powell coll.). JAPAN: Kikaigasima, Osumi (USNM). OKINAWA: (DMNH). MARIANAS: Apra Harbour, Guam I. (USNM). PALAU ISLANDS: S. of Ngariungens I., Kayangel group (AIM). MARSHALL ISLANDS: S. of Jabor, Jaluit Atoll (USNM). AUSTRALIA: Sand Cay No. 8, Queensland (DMNH). NEW GUINEA: near Hollandia (USNM). NEW BRITAIN: Nordup near Rabaul (USNM). SOLOMON ISLANDS: Pavuvu Island, Russell Strait; Treasury Island (both USNM); Roviana, New Georgia Island (McCollum coll.); Marau Sound, Guadalcanal (Gower coll.). NEW HEBRIDES: N. E. coast of Santa Maria I., Banks group (USNM); Ambrym Island (AIM); Teuma Bay, S.W. Efate I. (Cernohorsky coll.). LOYALTY ISLANDS: Lifu (USNM). FIJI ISLANDS: Cakaudrove coast, Vanua Levu (Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa (Gay coll.). SAMOA ISLANDS: Ofu, Manua group (USNM); Luatua'u'u, Upolu (Powell coll.); Mulinu'u, W. of Apia (Cernohorsky coll.). COOK ISLANDS: Tom's Islands, Palmerston Atoll (USNM). SOCIETY ISLANDS: Patutua, Tahiti; Fare Ute, Papeete, Tahiti (both USNM). TUAMOTU ISLANDS: Anaa Island (BMNH).

***Mitra ferruginea* Lamarck, 1811**

(Color pl. 256, figs. 9, 10; pl. 334; pl. 336, fig. 1.)

Range—Gulf of Aden to Polynesia, the Hawaiian Islands and Clipperton Island.

Remarks—This widely distributed species is superficially similar to *M. chrysostoma* Broderip, but differs in features of prominent spiral cords which continue without interruption to the margin of the outer lip and do not become faint or obsolete on the dorsal side of the body whorl; the margin of the outer lip is prominently crenulate along its entire length, and not smooth as in *M. chrysostoma*.

Habitat—On reefs, in crevices and under coral, from the intertidal zone to a depth of 15 fathoms.

Description—Shell up to 58 mm (about 2¼ inches) in length, fusiformly-ovate to elongate-ovate, heavy and solid, sutures distinct and sometimes adpressed on the last 2 whorls. Whorls 7-9, apart from a worn, conical protoconch, first 2-3 postnuclear whorls minutely clathrate, later whorls with prominent, elevated, rounded or flat-topped spiral cords which number from 4-6 on the penultimate and from 14-20 on the body whorl; the interspaces of the ribs are broad and concave and sculptured with numerous, macroscopic, longitudinal hair-lines. Aperture equal in height or

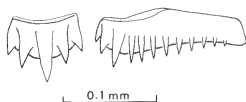


Plate 334. *Mitra (Nebularia) ferruginea* Lamarck. Half-row of radula. Suva reef, Fiji Islands.

longer than the spire, moderately narrow and smooth within; outer lip prominently thickened and occasionally reflected, and coarsely crenulate along its entire length. Columella glazed and with 4-5 oblique folds, siphonal fasciole straight or slightly twisted, siphonal notch distinct. White to cream in colour, ornamented with broad, dark reddish-brown axial zones which may form 2 interrupted broad zones on the body whorl; aperture and columella golden-yellow or orange. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
52.1	18.9	23.2	Kailua Bay, Oahu, Hawaii
47.0	18.5	26.2	Bay of Islands, Fiji I.
40.0	15.0	20.6	Boac I., Philippine I.
34.4	14.4	17.4	Kailua Bay, Hawaiian I.
32.0	12.2	16.0	Holotype of <i>lemma</i> Iredale
29.5	11.4	15.4	Paralectotype of <i>ferruginea</i> Lamarck
28.8	13.0	17.0	Malekula I., New Hebrides
25.7	10.9	14.5	Boac I., Philippine I.

Synonymy—

1780 "*Strombus fasciis niceis*" Chemnitz, Syst. Conchylien-Cabinet, vol. 4, p. 224, pl. 149, figs. 1380, 1381 (non binomial).

1811 *Mitra ferruginea* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 200 (no locality given); 1838 Kiener, *Spécies générale iconographie coquilles vivantes*, vol. 3, p. 24, pl. 8, fig. 23; 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 4, fig. 28; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 19, pl. 2, fig. 15; 1960 Hertlein & Allison, *Veliger*, vol. 3, p. 14; 1965 Cernohorsky, *Veliger*, vol. 8, p. 88, pl. 13, figs. 7, 7a; 1966, *Veliger*, vol. 9, p. 107, textfig. 8 (radula); 1969, *Revue Suisse Zoologie*, vol. 76, p. 957, pl. 1, fig. 5; (figured paralectotype); 1971 Wilson & Gillett, *Australian Shells*, p. 114, pl. 74, figs. 6, 6a.



Plate 336. Fig. 1. *Mitra (Nebularia) ferruginea* Lamarck Figs. 2-5 *M. (N.) rubritincta* Reeve.

Fig. 1. Holotype of *Chrysame lemma* Iredale, from Sydney Harbour, Australia (AMS C-57852; 32.0 x 12.2 mm) [photo courtesy of P. Colman, AMS].

Fig. 2. Lectotype of *Mitra (Nebularia) rubritincta* Reeve from Ticao Id., Philippine Ids.; broad form (BM (NH) 1967868; 34.6 x 16.0 mm).

Figs. 3, 4. Specimen from North coast of Oahu, Hawaiian Ids.; slender form *lienardi* Sowerby (Cross coll.; 21.0 x 8.0 mm).

Fig. 5. Probable holotype of *M. lienardi* Sowerby from Mauritius; slender form (ANSP 28725; 24.2 x 8.6 mm).

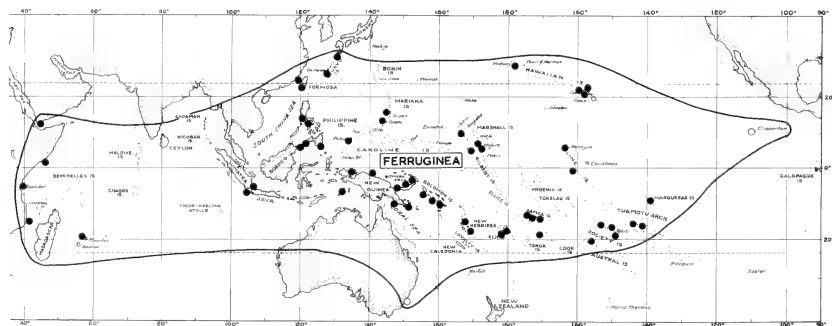


Plate 335. Geographical distribution of *Mitra (Nebularia) ferruginea* Lamarck.

1817 *Voluta vitulina* Dillwyn, Descr. cat. Recent shells, vol. 1, p. 553 (refers to Chemnitz, *op. cit.*, figs. 1380, 1381) [East Indian Seas]; 1825 Wood, Index Testaceologicus, p. 98, pl. 20, fig. 121a.

1829 *Mitra martiniana* Menke, Verz. Conchyl. Freih. von Malsburg, p. 82 (refers to Chemnitz, *op. cit.*, figs. 1380, 1381 [no locality given]).

1882 *Mitra (Chrysame) ferruginea (pars)* Lamarck, Tryon, Manual Conchology, vol. 4, p. 150, pl. 44, fig. 279 only.

1929 *Chrysame lemma* Iredale, Rec. Austral. Museum, vol. 5, pt. 4, p. 343, pl. 38, fig. 6 (Sydney Harbour, N.S.W., Australia); 1969 Garrard, Journ. Malac. Soc. Australia, no. 12, p. 11 (placed in synonymy of *M. ferruginea*).

1935 *Mitra (Nebularia) ferruginea* Lamarck, Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 70 (extended synonymy).

Types—Lamarck's type-specimens of *M. ferruginea*, originally described from the National Museum of Paris collection, still remain untraceable, but the paralectotype (which may have to be re-designated as the lectotype if the other specimens cannot be found) is in the Museum d'Histoire Naturelle, Geneva, no. 1102/47/4. The whereabouts of the type-specimen of *M. vitulina* (Dillwyn) and *M. martiniana* Menke are unknown, but may be among Chemnitz's unsorted material in the Zoological Museum, Copenhagen. The holotype of *M. lemma* (Iredale) is in the Australian Museum, Sydney, no. C. 57852. Lamarck did not indicate a locality, and Keledjitan, Bantam, Java, Indonesia, is designated as the type locality of *M. ferruginea* (specimens in USNM).

Records—GULF OF ADEN: Aden (USNM). EAST AFRICA: Mogadiscio, Somalia; Mocambique, Mozambique (both USNM). ZANZIBAR: (DMNH; Steiner coll.). MAURITIUS: (DMNH; USNM). INDONESIA: Pulau Penju, S. off Sumatra; Keledjitan, Bantam, Java (both USNM); W. side of Mitak I., Jamdena Straits, Tanimbar, 7°11'S & 131°25'E (WAM). PHILIPPINE ISLANDS: Davao Bay, Mindanao; Zamboanga, Mindanao; Mahibon near Manila; Simaluc I., Tatan I., Tawai Tawi group (all USNM); Boac, Marinduque (Cernohorsky coll.); Calapan, Mindoro (DMNH). CHINA: Whampoa (USNM). FORMOSA: S. Tawai, 100m (Steiner coll.). RYUKYU ISLANDS: S. Kunigami-Gun, Okinawa (USNM). JAPAN: Osima, Osumi (USNM; MCZ). MARIANAS: Saipan Island; Lagoona W. of Saipan (both USNM); Apra Harbour, Guam I. (USNM; Powell coll.). PALAU ISLANDS: reef N.W. of Tewel Island (USNM). MARSHALL ISLANDS: Majuro Atoll; Wotho Islands, Wotho Atoll; Mejjato I.; Jaluit Atoll (all USNM); Arno Atoll (AMNH). NEW GUINEA: near Gamodoto, Milne Bay; near Hollandia; Biak I., Schouten I. (all USNM); Ararat I., Siassi I. (Hinton coll.); Port Moresby (Kleckham coll.). NEW BRITAIN: Nordup near Rabaul (USNM); Talasea reef (AMNH). SOLOMON ISLANDS: Treasury Island; Pavuvu Island, Russell Strait (both USNM); Marau Sound, Guadalcanal (AMNH; Gower coll.; Cernohorsky coll.). NEW HEBRIDES: Bushmens Bay, Malekula I. (Cernohorsky coll.); Port Havannah, N. Efate I. (Debant coll.); Meli Bay, S.W. Efate I. (Colardeau coll.). FIJI ISLANDS: Suva, S. Viti Levu; Bay of Islands, Suva, S. Viti Levu, 8 faths. (Cernohorsky coll.); Wakaya Island (USNM). SAMOA ISLANDS: Apia Harbour, 4 faths. (Cernohorsky coll.); Otu, Manua group; Tutuila I. (both USNM); Vaeile Bay, Upolu I. (Powell coll.). NIUE ISLAND: Alofi, S. of jetty (USNM). ONEONE reef (Cernohorsky coll.). COOK ISLANDS: Mauke (USNM; AMNH). SOCIETY ISLANDS: Makatea (DMNH); Motu Tapu, Bora Bora; Tiareti, Tahiti; Motu Pahare, Huahine I. (all USNM). TUAMOTU ISLANDS: Makua Island; Temao

Harbour, Makatea (both USNM). MARQUESAS ISLANDS: Taihoa Bay, Nukuhiva (USNM). JARVIS ISLAND: (DMNH; AIM). LINE ISLANDS: Palmyra Island (USNM). HAWAIIAN ISLANDS: Honolulu Harbour, Oahu (USNM; Powell coll.) off Maui, Oahu, 5-6 faths.; Makua, Oahu, 3-9 faths. (both AMNH); Kailua Bay, Oahu, 11 faths. (Cernohorsky coll.). MIDWAY ISLAND: (USNM). CLIPPERTON ISLAND: (Hertlein & Allison, 1960).

Mitra rubritincta Reeve, 1844

(Color pl. 256, figs. 11, 12; pl. 336, figs. 2-4)

Range—Mauritius to Polynesia and the Hawaiian Islands.

Remarks—The species is occasionally confused with *M. ferruginea* Lamarck, but differs appreciably in form, and features of narrower spiral threads, coarse axial folds, convex outer lip and ornamentation. *Mitra rubritincta* has been based on the broad, barrel-shaped form, while *M. lienardi* Sowerby, is the slender, elongate-ovate form of the species. The coarse and crude axial folds and undulating spiral threads are characteristic of the species.

Habitat—On reefs, in crevices and under coral, from the intertidal zone to a depth of 10 fathoms.

Description—Shell up to 37 mm (about 1½ inches) in length, ovate and barrel-shaped or elongate-ovate, rather solid, sutures weakly impressed but sometimes narrowly ledged. Whorls 7-9, apart from a worn protoconch, spire whorls flat-sided, body whorl slightly constricted below the suture; first 2-4 post-nuclear whorls with 3 prominent spiral cords, penultimate whorl with 3-4, rarely 5 cords, and body whorl with 14-21 spiral cords; the spirals are narrower than in *M. ferruginea* and the interspaces between the cords are concave and axially striate. Coarse and broad axial folds appear on the second half of the antepenultimate whorl and persist to the body whorl; the spiral cords are undulate on the whorls with axial folds. Aperture equal in height to or longer than the spire, moderately open and smooth within; outer lip thickened and regularly convex, ornamented with scallop-like denticles at the margin. Columella slightly calloused anteriorly, and with 5, rarely 4, oblique folds; siphonal fasciole straight, occasionally slightly calloused, siphonal notch distinct but shallow. White in colour, ornamented with irregular, bright dark red axial streaks on the spire whorls and 2 spiral rows of axial blotches on the body whorl, leaving a broad white zone in the centre; aperture and columella cream in colour. Periostracum thin and brown in colour.

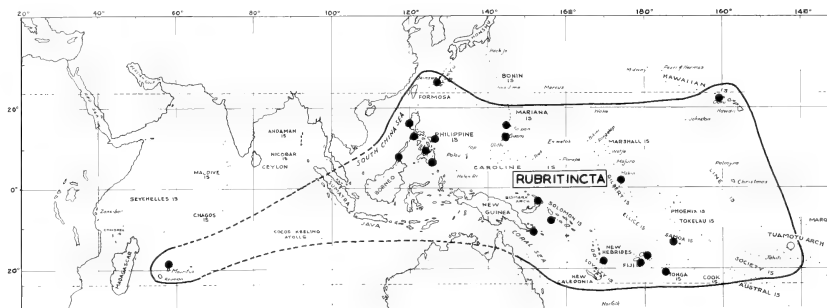


Plate 337. Geographical distribution of *Mitra* (*Nebularia*) *rubritincta* Reeve.

Measurements (mm)—

length	width	height of aperture	
34.6	16.0	20.2	Lectotype of <i>rubritincta</i>
32.8	15.9	20.0	Bay of Islands, Fiji I.
29.8	14.0	18.9	Nuku'alofa, Tonga I.
24.2	8.6	11.3	Probable holotype of <i>lienardi</i>
23.0	9.4	12.7	Philippine Islands
20.0	7.3	10.0	off Makua, Hawaiian I.

Synonymy—

- 1844 *Mitra rubritincta* Reeve, *Conchologia Iconica*, vol. 2, pl. 19, fig. 147 (Island of Ticao, Philippine Islands); 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 12, pl. 16, fig. 295; 1965 Cernohorsky, *Veliger*, vol. 8, p. 96, pl. 16, fig. 44.
 1874 *Mitra lienardi* Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 12, pl. 14, fig. 239 (no locality given).
 ?1923 *Mitra lienardi* var. *emaciata* Dautzenberg & Bouge, *Journal de Conchologie*, vol. 67, p. 124, pl. 2, figs. 8, 9 (as *M. lienardi* var. *pluricostata* on plate explanation) (Lifu, Loyalty Islands).
 1952 *Mitra* sp. Tinker, *Pacific Sea Shells*, plate facing p. 72, top row, fig. on left.

Types—The lectotype, here designated, and 2 syntypes of *M. rubritincta* Reeve, are in the British Museum (NH) no. 1967868. The probable holotype of *M. lienardi* Sowerby, may be the specimen in the Academy of Natural Sciences of Philadelphia, no. 28725, ex-Sowerby coll., with the locality "Mauritius" marked on the label. The type locality of *M. rubritincta* is Ticao Island, Philippine Islands.

Records—MAURITIUS: (ANSP; Dautzenberg & Bouge, 1923. INDONESIA: Marudu Bay, N. Borneo (USNM). PHILIPPINE ISLANDS: Samar Island; Pangangan I., Bohol (both Steiner coll.); Boac, Marinduque; Subic Bay, Luzon I. (both DMNH); Davao (MCZ). RYUKYU ISLANDS: S. Kunigami-Gun, Okinawa (USNM). MARIANAS: Saipan Island (USNM). NEW GUINEA: Gamododo, Milne Bay (USNM). NEW BRITAIN: Rabaul (McCollum coll.). SOLOMON ISLANDS: New Georgia Island (Powell coll.). NEW HEBRIDES: S. Efate Island (Allan coll.). LOYALTY ISLANDS: (Dautzenberg & Bouge). FIJI ISLANDS: Georgia

Cove, Rabi I., Vanna Levu (USNM); Bay of Islands, Suva, S. Viti Levu, 8 faths. (Cernohorsky coll.). MARIANAS: Apra Harbour, Guam (Salisbury coll.). GILBERT ISLANDS: Betio-Bairaki causeway, Tarawa I. (Holmes coll.). TONGA ISLANDS: Nuku'alofa (Cernohorsky coll.). SAMOA ISLANDS: (Powell coll.). TUAMOTU ISLANDS: (Dautzenberg & Bouge, 1923). HAWAIIAN ISLANDS: N. coast of Oahu (Cross coll.); off Makua, Oahu, 7-8 faths. (Deynzer coll.).

Mitra cucumerina Lamarck, 1811

(Color pl. 256, figs. 13-15; pl. 338, fig. 1)

Range—Red Sea to Polynesia and the Hawaiian Islands.

Remarks—The species is similar to *M. chrysalis* Reeve, but differs in being less obese and pupiform in shape, the spire is more acuminate, the whorls longer and aperture shorter. In *M. chrysalis* the sculpture consists of narrow spiral grooves which produced broad and flat cords on the centre of the body whorl, whereas in *M. cucumerina* the cords are elevated and angulate, and the interspaces between the cords are broad and "V"-shaped.

Habitat—On reefs, under coral and in crevices, from the intertidal zone to a depth of 10 fathoms.

Description—Shell up to 34 mm (about 1½ inches) in length, but rarely exceeding 27 mm (about 1 inch), globose, acuminate at both ends and solid, sutures weakly impressed. Whorls 7-9, apart from protoconch which is usually eroded, sculptured with prominent, elevated and angulate spiral cords which number from 3-4 on the penultimate and up to 20 on the body whorl; the interspaces are deep, "V"-shaped, axially prominently striate and equal in width or broader than the spiral cords. Aperture longer than the spire, very narrow and smooth within; outer lip very thick and prominently crenulate, crenulations decreasing in size anteriorly. Columella calloused and with 3-4 folds, first posterior fold very large, last anterior fold small; siphonal fasciole straight

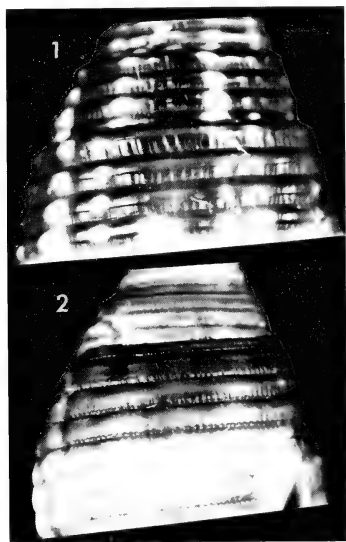


Plate 338. Close-up of sculptural detail.

Fig. 1. *Mitra (Nebularia) cucumerina* Lamarck.Fig. 2. *M. (N.) chrysalis* Reeve.

or sometimes recurved, occasionally weakly caloused, siphonal notch prominent. Reddish-orange to dark blood-red in colour, ornamented with an interrupted, white or yellowish-white central band on the body whorl, and a few spots upon the ribs above and below the band; in some specimens the spiral ribs are lighter than the base colour. Aperture and columella orange-brown, tip of spire frequently white. Periostracum thin and brown in colour.

Measurements (mm)—

length	width	height of aperture	
27.4	15.2	17.3	Watson's Isle, Samoa I.
26.3	13.9	16.4	Lectotype of <i>cucumerina</i>
23.2	12.5	15.0	Phuket I., Thailand
17.0	8.7	10.8	Eilat, Gulf of Aqaba
13.3	6.0	8.4	Mokolea Rock, Hawaiian Ids.

Synonymy—

- 1780 "*Turricula globosa*" Chemnitz, Syst. Conchylien-Cabinet, vol. 4, p. 232, pl. 150, figs. 1398, 1399 (non binomial).
 1798 ——— Tabl. Encycl. Méthodique, pl. 375, fig. 1.
 1802 *Voluta turricula* Holten, Enum. syst. Conchyliorum, p. 46 (refers to Chemnitz, *op. cit.*, fig. 1398 [non Gmelin, 1791]).
 1811 *Mitra cucumerina* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 215 (no locality given); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 62, pl. 9,

fig. 24 (Indian Ocean); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 25, fig. 201; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 12, pl. 16, figs. 275-277; 1955 Risbec, Journal de Conchyliologie, vol. 95, p. 79, fig. 4 (anatomy); 1965 Cernohorsky, Veliger, vol. 8, p. 87, pl. 17, figs. 50, 50a; 1966, Veliger, vol. 9, p. 107, textfig. 9 (radula); 1969, Revue Suisse Zoologie, vol. 76, p. 978, pl. 5, fig. 37 (figured lectotype).

- 1817 *Voluta ferrugata* Dillwyn, Descr. cat. Recent shells, vol. 1, p. 535 (no locality given) [refers to Chemnitz, *op. cit.*, figs. 1398, 1399 and Tabl. Encycl. Méth., pl. 375, fig. 1].
 1852 *Mitreola globosa* Mörch, Cat. Conchyl. Com. Yoldi, vol. 1, p. 83 (no locality given) [refers to Chemnitz, *op. cit.*, figs. 1398, 1399].
 1874 *Mitra tabanula* Lamarck, Sowerby, Thesaurus Conchyliorum, vol. 4, p. 12, pl. 367, figs. 280, 281 (non Lamarck, 1811).
 1883 *Mitra (Chrysme) cucumerina (pars)* Lamarck, Tryon, Manual Conchology, vol. 4, p. 143, figs. 227, 228 only.
 1923 *Mitra (Chrysme) cucumerina* var. *pallida* Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 119 (Lifu, Loyalty Islands) [non *M. pallida* A. Adams, 1853].
 1923 *Mitra (Chrysme) tabanula* var. *connectens* Dautzenberg & Bouge, *ibid.*, p. 132 (Isle des Pins = New Caledonia) [refer to Sowerby, *op. cit.*, pl. 367, figs. 280, 281].

Types—The lectotype of *M. cucumerina* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/76/2. The type specimen of *M. turricula* (Holten), *M. ferrugata* (Dillwyn) and *M. globosa* (Mörch), may be among Chemnitz's unsorted type material in the Zoological Museum, Copenhagen. The first correct locality indication for the species is "Indian Ocean" given by Kiener, and we designate Ambon Island, Indonesia, as the type locality of *M. cucumerina* (specimens in WAM).

Records—RED SEA: Eilat, Gulf of Aqaba (Haime coll.; Peled coll.; Steiner coll.; Cernohorsky coll.); 20 mi. N. of Jiddah, Saudi Arabia (USNM). EAST AFRICA: Mogadiscio, Somalia; Mocambique, Mozambique (both USNM). INDIAN OCEAN ISLANDS: Felicite I., Seychelles I. (USNM); Mauritius (USNM; DMNH; Powell coll.); Faia Island, Mauritius (ZMC); Tanikely I., W. of Madagascar (AMNH). THAILAND: reef Ao Rawai, Ko Phuket; Goh Phi Phi (both USNM); Phuket Island (Cernohorsky coll.). INDONESIA: N. shore of Toba I., N. end Aru I., 1-2 faths.; Tg. Nama, S. side of Ambon Bay, Ambon I. (both WAM); PHILIPPINE ISLANDS: Cabra I., Lubang I., Mindoro (USNM; Del. Mus. N.H.); Subic Bay, Luzon; Palawan Island (both Clover coll.). MARIANAS: Saipan Island (USNM). CAROLINE ISLANDS: Ulithi Atoll (USNM); MARSHALL ISLANDS: Kwajalein Island (AMNH). NEW GUINEA: Taurama reef, Port Moresby (Kleckham coll.); near Hollandia, Finschhafen (both AMNH). AUSTRALIA: Yepoon, Queensland (Marrow coll.); Wilson Island, Queensland (USNM); Barrow Island, W. Australia (WAM). SOLOMON ISLANDS: Bougainville (Clover coll.); Marau Sound, Guadalcanal (Cernohorsky coll.); Malaita I. (DMNH). LOYALTY ISLANDS: Lifu (AIM); Islet Deguala, Uvea (USNM). GILBERT & ELLICE ISLANDS: reef-flats at Nukulaiki, Ellice I. (USNM); Bikenibeu, Tarawa I., Gilbert I. (Cernohorsky coll.). WALLIS ISLANDS: E. of Nukuhifala; Faioa (Both USNM). FIJI ISLANDS: Cuvu Beach, S.W. Viti Levu; St. Annes, Nadroga reef, S. Viti Levu; Bat Tail Passage, Suva reef, S. Viti Levu (all Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa (USNM; Cernohorsky coll.). SAMOA ISLANDS: Vaotua, Vailele Bay, Upolu I. (USNM; Powell coll.); Otu, Manua group; outer reef at Apia; Asau harbour (all USNM); Watson's Isle; Fagali'i, Upolu I. (both Powell coll.); Mulunui, W. of Apia (Cernohorsky coll.). COOK ISLANDS: Penrhyn Island (AMNH); Rarotonga (Powell coll.). AUSTRAL IS-

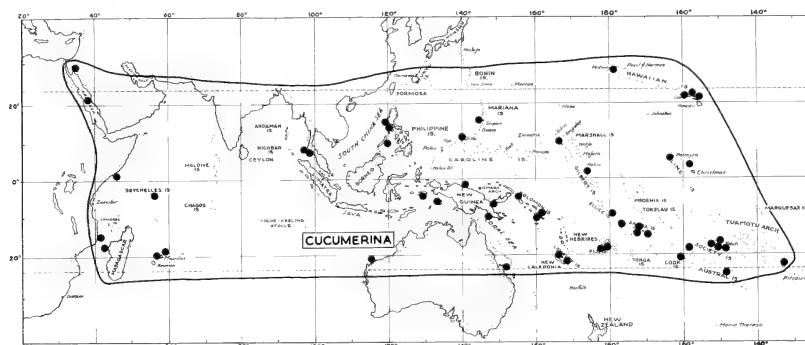


Plate 339. Geographical distribution of *Mitra (Nebularia) cucumerina* Lamarck.

LANDS: Matarau, Tubuai I. (USNM). SOCIETY ISLANDS: Ilot Tapaemano, Raiatea; Papapara, Tahiti; Motu Pahare, Huahine; Moorea (all USNM); Point Venus, Tahiti (Clover coll.). GAMBIER ISLANDS: Ilot Tarau-roa, Mangareva (USNM). LINE ISLANDS: Fanning Island (DMNH; AIM); Jarvis I. (DMNH). PALMYRA ISLAND: (DMNH; USNM). HAWAIIAN ISLANDS: off Makua, Oahu, 7-8 faths. (Deynzer coll.); Shark's Bay (Leehman coll.); Honokowai, Maui (USNM); Mokolea Rock, Kailua Bay, Oahu, 10 faths. (AMNH; Cernohorsky coll.); Honolulu Harbor (AIM). MIDWAY ISLANDS: (USNM).

***Mitra chrysalis* Reeve, 1844**

(Color pl. 256, figs. 16-17; pl. 338, fig. 2; pl. 340)

Range—Red Sea to the Cook Islands, Polynesia.

Remarks—The species is similar to *M. cucumerina* Lamarck, but differs from that species by being more cylindrically-ovate, pupiform, with distinctly shorter spire whorls and less acuminate spire. The difference in sculpture is rather pronounced: in *M. chrysalis* the spiral grooves are shallow and frequently punctate rather than axially striate, and the resulting cords are considerably broader than the interspaces, hardly elevated in the central part of the body whorl or flat or feebly rounded. In *M. cucumerina* the spiral cords are prominently elevated and angulate, the interspaces are as broad or broader than the spiral cords and prominently axially striate. The species are similar in exterior colouring and ornamentation, but the basic colour in *M. cucumerina* is dark blood-red whereas in *M. chrysalis* the colour varies from a pale orange-brown to dark brown; the white interrupted central band on the body whorl of *M. cucumerina* is more distinct and brighter. The aperture is longer in *M. chrysalis*, the columella is more strongly calloused and the base of

the body whorl is not as strongly constricted as in *M. cucumerina*, and the siphonal fasciole appears shorter and thicker.

Some specimens lack the pale central girdle composed of irregular spots, and are uniformly brown in colour; this colour form occurs in Zanzibar, the Andaman Islands, New Hebrides and New Caledonia, and has been described as *M. caledonica* Recluz and *M. buryi* Melvill & Sykes. The latter form from the Andaman Islands, has broader interspaces and slightly more elevated spiral cords, especially those near the suture and base. The largest specimen of *M. chrysalis* examined, measured 29.0 mm in length. The radulae of *M. chrysalis* and *M. cucumerina* also differ: the rachidian tooth of *M. chrysalis* has 8-10 cusps, whereas the rachidian of *M. cucumerina* has only 3-5 cusps.

Habitat—On reefs, under coral rocks and in crevices, generally in the intertidal zone but occasionally found at depth of 8 fathoms.

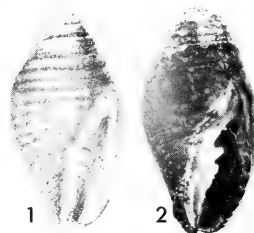


Plate 340. *Mitra (Nebularia) chrysalis* Reeve.

Fig. 1. Lectotype figure of *M. (N.) chrysalis* Reeve (from Reeve, 1844, pl. 25, fig. 200).

Fig. 2. Lectotype of *M. buryi* Melvill and Sykes from the Andaman Ids. (BM (NH) 1899.2.18.2; 13.8 x 7.0 mm).

Measurements (mm)—

length	width	height of aperture	
25.0	11.6	15.0	Mulinuu, Samoa
21.0	11.0	—	Type-specimen of <i>caledonica</i>
17.4	9.5	11.8	Boac I., Philippines
13.8	7.0	9.7	Lectotype of <i>buryi</i>
12.0	6.3	8.0	Okinawa, Ryukyu Ids.

Synonymy—

1839 *Mitra leucozona* Küster, Syst. Conchylien-Cabinet, ed. 2, vol. 5, p. 104, pl. 17, figs. 9-11 (East Indies) [non Andrzejowski, 1830].

1844 *Mitra chrysalis* Reeve, Conchologia Iconica, vol. 2, pl. 25, fig. 200 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 21, fig. 437; 1882 Tryon, Manual Conchology, vol. 4, p. 144, pl. 42, fig. 233; 1965 Cernohorsky, Veliger, vol. 8, p. 83, pl. 17, figs. 51, 51a; 1970, Bull. Auckland Inst. Museum, no. 8, p. 13, textfig. 54 (radula).

1853 *Mitra caledonica* Récluz, Journal de Conchyliologie, vol. 4, p. 248, pl. 7, fig. 7 (New Caledonia).

1899 *Mitra (Chrysam) buryi* Melvill & Sykes, Proc. Malac. Soc. London, vol. 3, pt. 4, p. 222, textfig. 1 (Andaman Islands).

Types—The type-specimen of *M. chrysalis* is untraceable and has been probably sold at auction of the Norris collection; the specimen figured by Reeve on plate 25, figure 200, is here designated as the lectotype of *M. chrysalis*. The holotype of *M. caledonica* Récluz, is in the Museum National d'Histoire Naturelle, Paris ("Journal de Conchyliologie" coll.). There are 3 syntypes of *M. buryi* Melvill & Sykes in the British Museum (NH) no. 1899.2.18.2-4, but the specimen figured by the authors in the original description is not among the syntypes. Reeve did not give a locality but Küster reported his *M. leucozona* from the East-Indies. Pombo Island, Haruku Straits, East of Ambon, Indonesia, is here designated as the type locality of *M. chrysalis* (specimen in WAM).

Records—RED SEA: Eilat, Gulf of Aqaba (Hadar coll.). EAST AFRICA: Mboa Magi, Tanganyika (USNM); Porto Amelia, Mozambique (Orr coll.); ZANZIBAR: (USNM; AMNH); Chwaka, N. Nyangale (AMNH); Chango Island (AIM) lighthouse near Mkunduchi (Powell coll.). INDIAN OCEAN ISLANDS: Poivre, Seychelles Islands (Cernohorsky coll.). Nossi-Bé, Madagascar (Clover coll.); Mauritius (USNM); Port Blair, Andaman Islands (Cernohorsky coll.). THAILAND: Goh Phi Phi (USNM). INDONESIA: Pulau Penju, S. of Sumatra; Pulau Buenta, off Aceh Heads, N.W. Sumatra (both USNM); S. end of Luluu I., S.W. Kajoa I.; Kampong Namatubung, Labuan Olendur, Selaru; Waratneu I.; Jampund, Kai I., W. side of Mitak I., Jamdena Straits, Timbar; Pombo I., Haruku Straits, E. of Ambon (all WAM). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.); Cabra I., Lubang I., Mindoro; Manila Bay, Luzon (both USNM); Boac, Marinduque (Cernohorsky coll.). RYUKYU ISLANDS: reef off Ogimi, Okinawa-Shima; Kadena Circle, Okinawa (both USNM) Minatogawa, Okinawa (Cernohorsky coll.). JAPAN: Kii (AMNH). MARIANAS: Mang Island; Tumou Bay, Guam I. (both USNM); N. of Facip Point, Agat Bay, Guam I. (AMNH); Nimitz beach, Guam I. (Cernohorsky coll.). PALAU ISLANDS: Kayangel Island (DMNH; USNM). CAROLINE ISLANDS: reef at Mutunlik, Kusaie I.; Elato Atoll; Ulithi Atoll (all USNM); Losap I., Mortlocks (DMNH) MARSHALL ISLANDS: Lae I., Lae Atoll; Aaranbiru, Eniwetok Atoll; outer reef at Namu I., Bikini Atoll; Kabelle I., Rongelap Atoll; Majatto I., Jaluit Atoll; Elizabeth I., Jaluit Atoll (all USNM); Kwajalein I. (AMNH). NEW GUINEA: Ela beach, Port Moresby (Kleckham coll.); Moies Woendi, Schouten I.; Pai I., Padoado Islands (both Powell coll.). SOLOMON ISLANDS: Ugi Island (USNM); Marau Sound, Guadalcanal (Cernohorsky coll.). NEW HEBRIDES: S.E. of Inyeng I., Aneityum I., Black beach, Tanna I.; Uta, Aneityum I.; Palikulo Bay, Espiritu Santo; Little Malo Kili Kili, Espiritu Santo (all USNM); Malapoa Point, Viti Levu, Uvea I.; Uvea I., opposite E. coast of Malekula I. (both AIM); Bushmens Bay, Malekula I.; Pango reef, Elate I. (both Cernohorsky coll.). NEW CALEDONIA: Nani Island (USNM); Touho Bay (Powell coll.). LOYALTY ISLANDS: Ilot Degula, Uvea (USNM); Lifu Island (AIM). GILBERT & ELLICE ISLANDS: Onotooa Atoll, Gilbert I.; Vaitupu, Ellice I. (both USNM). WALLIS & FUTUNA ISLANDS: Sigave Bay, Hoom I.; Futuna I., Nukuhifala, Wallis I. (both USNM). FIJI ISLANDS: Wakaya Island; Suva, S. Viti Levu (both Powell coll.); Malolo Island, Mamanuca group, (Jennings coll.); Cuvu Beach, S.W. Viti Levu; Viti Levu Bay, N.E. Viti Levu (both Cernohorsky coll.). TONGA ISLANDS: Niutoua, Tongatapu (USNM); Nuku alofa, Tongatapu (Gay coll.). SAMOA ISLANDS: Vaoto, Vailele Bay, Upolu I. (USNM; Powell coll.); Ofu, Manua group; Pango Pango; Asau Harbour, Savaii (all USNM); Watson's Isle (AIM); Mulinuu, W. of Apia (Cernohorsky coll.). NIUE ISLAND: (McDowall coll.); Alofi, S. of jetty (USNM). COOK ISLANDS: Rarotonga (AIM).

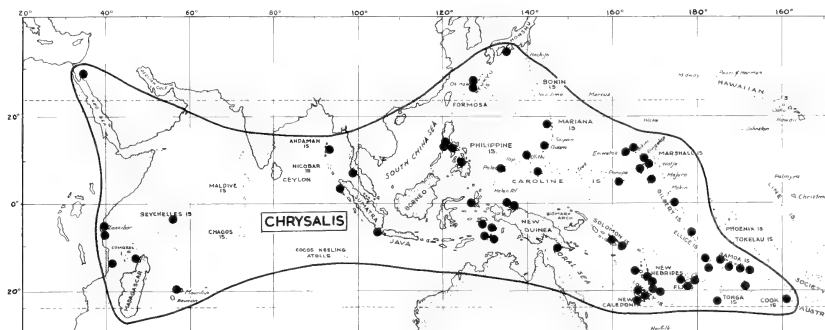


Plate 341. Geographical distribution of *Mitra (Nebularia) chrysalis* Reeve.

***Mitra fraga* Quoy & Gaimard, 1833**

(Color pl. 256, figs. 18-21; pl. 342)

Range—Red Sea to Polynesia and the Hawaiian Islands.

Remarks—Having examined about 500 specimens of *M. fraga* and "*M. tornata*" Reeve, we have encountered numerous intergrades which clearly connect the two species and several named variants. *M. fraga* was described from a small, immature and broad specimen with pale spots upon the spiral cords. *M. peregrina* represents the same colour form but is slightly more slender. The syntypes of *M. tornata* are very worn and juvenile specimens of the slender form of *M. fraga*, lacking the pale spots on the cords, while

M. rubiginea A. Adams and *M. carinilirata* Souverbie, were based on large and broad examples with only a few pale spots upon the ribs. Fresh specimens are uniformly dark reddish-brown, others are ornamented with a few or numerous and regularly arranged pale spots upon the spiral cords; in weathered specimens the shell is reddish-orange and the spots are white. In specimens from the Red Sea, the yellowish-cream colour is so dense that the shell appears to be spotted with reddish-brown.

Habitat—On reefs, in crevices and under coral, from the intertidal zone to a depth of 15 fathoms.

Description—Shell up to 48 mm (about 2 inches) in length, but generally from 15-35 mm ($\frac{3}{4}$ -1½ inches) in length, elongate ovate to roundly-ovate, solid, sutures weakly impressed. Whorls 6-8, apart from protoconch of 2 glassy-white nuclear whorls, spire whorls flat-sided or slightly convex, frequently angulate or subangulate at the sutures; sculptured with elevated and angulate spiral cords which number from 3-6 on the penultimate and from 13-18 on the body whorl. The cords are occasionally undulate on the body whorl by the appearance of weak longitudinal folds, the intervening spiral grooves are deep and "V"-shaped and axially striate; the sutural spiral cord is frequently smaller than the succeeding cords. Aperture about equal in height or longer than the spire, moderately narrow and smooth within; outer lip thickened, regularly convex and crenulate at the margin in adult specimens. Columella calloused, especially anteriorly and sometimes only glazed on the parietal wall, and with 4-5, rarely 3, oblique folds; siphonal fasciole calloused, straight or recurved, siphonal notch distinct. Fresh specimens are uniformly dark reddish-brown in colour, but are frequently ornamented with a few or numerous, cream, yellow or orange spots upon the spiral cords; specimens from the Red Sea are creamy-yellow and spotted on the cords with reddish-brown. The aperture and columella are greyish-white, but frequently flushed with orange-brown. Periostracum thin, orange-brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
45.8	19.0	24.6	Caboni beach, Fiji I.
39.4	15.0	20.4	Lectotype of <i>rubiginea</i>
37.0	14.0	19.0	Type of <i>carinilirata</i>
33.3	13.8	18.5	Pango Point, New Hebrides
23.5	8.9	12.4	Lectotype of <i>cingulata</i>

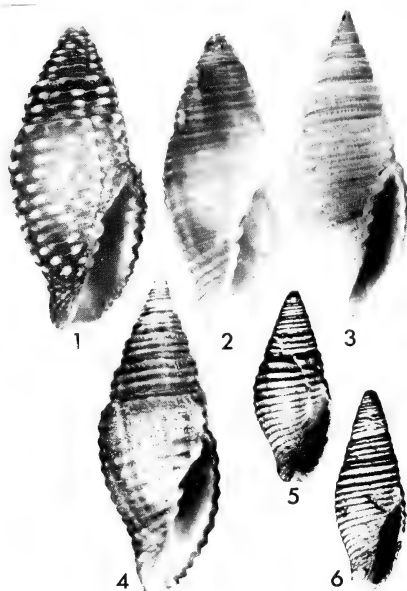


Plate 342. *Mitra (Nebularia) fraga* Quoy and Gaimard.

Fig. 1. Lectotype of *M. peregrina* Reeve from Masbate Id., Philippine Ids. (BM (NH) 1967835; 22.6 x 10.0 mm).

Fig. 2. Syntype of *M. tornata* Reeve from Guimaras Id., Philippine Ids. (BM (NH) 1967897; 20.4 x 7.4 mm).

Fig. 3. Lectotype of *M. cingulata* A. Adams (BM (NH) 1967721; 23.5 x 8.9 mm).

Fig. 4. Lectotype of *M. rubiginea* A. Adams from Australia (BM (NH) 1967865; 39.4 x 15.0 mm).

Fig. 5. Type specimen of *M. idjowensis* Oostingh from Tjidjow, Bantam, Pliocene of Java (from Oostingh, 1939, pl. 11, fig. 195; 12.2 x 5.2 mm).

Fig. 6. Type specimen of *M. subidjowensis* Oostingh from Tjidjow, Bantam, Pliocene of Java (from Oostingh, 1939, pl. 11, fig. 196; 13.0 x 5.0 mm).

22.6	10.0	12.8	Lectotype of <i>peregra</i>
18.8	8.2	10.0	Apia Harbour, Samoa I.
18.3	6.9	9.5	Lectotype of <i>tornata</i>
15.8	7.9	—	Type-specimen of <i>fraga</i>
14.0	6.7	7.8	Pango Point, New Hebrides
13.0	5.0	7.5	Type of <i>subidjowensis</i>
12.2	5.2	6.2	Type of <i>idjowensis</i>

Synonymy—

- 1833 *Mitra fraga* Quoy & Gaimard, Voyage L'Astrolabe, vol. 2, p. 660, pl. 45 bis, figs. 28, 29 (no locality given) [juvenile specimen]; 1838 Kieuer, Species general iconographie coquilles vivantes, vol. 3, p. 63, pl. 9, fig. 26; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 13, pl. 16, fig. 284; 1965 Cernohorsky, Veliger, vol. 8, p. 89, pl. 16, fig. 42; 1966, Veliger, vol. 9, p. 106, textfig. 6 (radula).
- 1839 *Mitra miniata* Anton, Verz. Conchylien, p. 67 (no locality given); 1839 Küster, Syst. Conchylien-Cabinet, ed. 2, p. 77, pl. 14, figs. 8-10 (*fraga* form).
- 1844 *Mitra peregra* Reeve, Conchologia Iconica, vol. 2, pl. 24, fig. 186 (Island of Masbate, Philippines); 1880 Garrett, Journal of Conchology, vol. 3, p. 23; 1951 Laserna, Rec. Austral. Museum, vol. 22, no. 4, p. 335 (*fraga* form).
- 1845 *Mitra tornata* Reeve, Conchologia Iconica, vol. 2, pl. 33, fig. 269 (Islands of Guimaras, Philippines); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 9, pl. 25, fig. 553; 1965 Cernohorsky, Veliger, vol. 8, p. 100, pl. 16, fig. 38; 1970, Bull. Auckland Inst. Museum, no. 8, p. 14, textfigs. 60, 60a (radula).
- 1853 *Mitra cingulata* A. Adams, Proc. Zool. Soc. London, for 1853, p. 136 (no locality given) [non Lamarck, 1811] (*tornata* form).
- 1855 *Mitra rubiginea* A. Adams, Proc. Zool. Soc. London, p. 134 (Australia); 1965 Cernohorsky, Veliger, vol. 8, p. 96, pl. 16, fig. 41 (*tornata* form).
- ?1870 *Mitra (Nebularia) williamsi* Newcomb, American Journ. Conchology, vol. 5, pt. 3, p. 163, pl. 17, fig. 5 (Philippines or Guam?).
- 1871 *Mitra carinilirata* Souverbie, Journal de Conchyliologie, vol. 19, p. 335 (Isle Art, New Caledonia); 1872 *ibid.*, vol. 20, p. 49, pl. 1, fig. 1 (*tornata* form).
- 1939 *Mitra (Chrysame) idjowensis* Oostingh, Ingen. Nederl.-Indie, vol. 6, p. 44, pl. 11, figs. 195a, b (Tjiidjow, Bantam, Java; Pliocene) [juvenile specimen].
- 1939 *Mitra (Chrysame) subidjowensis* Oostingh, *ibid.*, p. 45, pl. 11, figs. 196a, b (Tjiidjow, Bantam, Java; Pliocene) [juvenile specimen].

1967 *Mitra (Chrysame) fraga* Quoy & Gaimard, Ori-Maes, Proc. Acad. Nat. Sci. Philadelphia, vol. 119, no. 4, p. 138, pl. 13, fig. 1.

Types—The type-specimen of *M. fraga* Quoy & Gaimard, is in the Muséum National d'Histoire Naturelle, Paris, and the holotype of *M. carinilirata* Souverbie, is in the same Institution ("Journal de Conchyliologie" coll.). The following types are in the British Museum (NH): the lectotype, here designated, and 1 syntype of *M. peregra* Reeve, B.M. (NH) no. 1967835; the lectotype, here designated, and 2 syntypes of *M. tornata* Reeve (juvenile specimens), B.M. (NH) no. 1967897, and the lectotype, here designated, and 2 syntypes of *M. rubiginea* A. Adams, B.M. (NH) no. 1967865 (immature and juvenile specimens). The two syntypes of *M. cingulata* A. Adams (non Lamarck), B.M. (NH) no. 1967721, are two different species: the larger, 23.5 mm long specimen is a beach-worn, faded *M. fraga*, and since only this specimen corresponds to Adams' description, it is here designated as the lectotype; the other, smaller specimen, length 19.7 mm, is the species *M. suturata* Reeve. The type-specimens of *M. idjowensis* and *M. subidjowensis* Oostingh, are probably in the Geological Museum, Bandung, Indonesia. No locality was given by Quoy and Gaimard, and we designate Reeve's locality indication of Masbate Island, Philippine Islands, as the type locality of *M. fraga*.

Nomenclature—The type-specimen of *M. williamsi* Newcomb, is lost, but his type figure resembles to some extent *M. fraga*. Specimens labelled "*M. williamsi* Newcomb" in the National Museum of Natural History, Washington, are *M. fraga*.

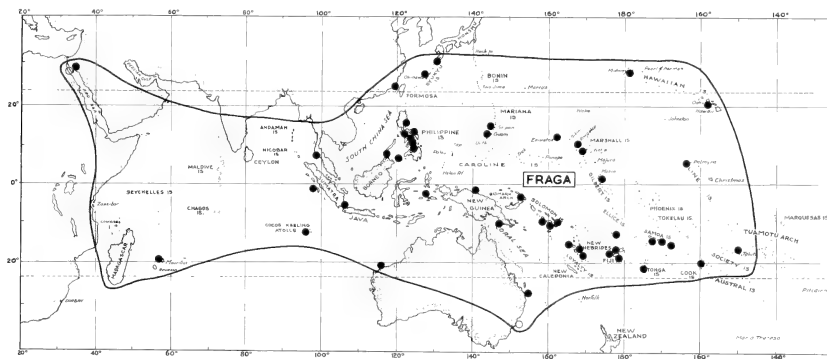


Plate 343. Geographical distribution of *Mitra (Nebularia) fraga* Quoy and Gaimard.

Records—RED SEA: Eilat, Gulf of Aqaba (Hadar coll.; Clover coll.; Peled coll.); Gulf of Suez (Jickeli, 1874). INDIAN OCEAN ISLANDS: Mauritius (USNM); N. end of Pulo Siput, Cocos-Keeling I. (USNM). THAILAND: Goh Phi Phi (USNM). INDONESIA: Marudu Bay, N. Borneo, Pulau Bay, Batu group, off Sumatra; Keledjitan, Bantam, Java (all USNM); W. coast of Gomumu I., S. of Obi I. (WAM). PHILIPPINE ISLANDS: Pangangon I., Bohol (Steiner coll.); Boac, Marinduque (Lumawig coll.); Davao, Mindanao; Tobigui, Marinduque (both USNM); Masbate Island; Ticao Island (both AMNH); Zambales, Luzon; Cebu Island (both Clover coll.); Banan, Batangas Bay; Siasi I., Sulu (both Cernohorsky coll.). CHINA: Whampoa (USNM). RYUKYU ISLANDS: Okinawa (USNM). JAPAN: Osima, Osumi (USNM). MARIANAS: Apra Harbour, Guam I.; Saipan Island (both USNM); Nimitz beach, Guam I. (Cernohorsky coll.); Oca Point, Guam (MCZ). MARSHALL ISLANDS: Jieroru, Eniwetok Atoll; Roggotou, Rongelap Atoll; Kwajalein Atoll (all USNM). NEW GUINEA: Taurama beach, Port Moresby (Hinton coll.); Ela beach, Port Moresby (Kleckham coll.); near Hollandia (USNM). AUSTRALIA: S. end of Flacourt Bay, 20°46'S & 115°21'E, W. Australia; Shelly Beach, Caloundra, Queensland (Powell coll.); New South Wales (Laseron, 1951). NEW BRITAIN: Rabaul (McCollum coll.; Buick coll.). SOLOMON ISLANDS: Ugi Island; Pavuvu I., Russell Strait (both USNM). MARAU Sound, Guadalcanal (Cernohorsky coll.). NEW HEBRIDES: Pukulu Bay, Espiritu Santo (USNM); Port Havannah, N.E. Efate I. (Debant coll.); Pango Point, Efate I., Bushmens Bay, Malekula I. (both AIM); Meli Bay, S.W. Efate I., Malapoa Point, Vila Harbour, Efate I., Ure I., opposite E. coast of Malekula I. (all Cernohorsky coll.). ROTUMA ISLANDS: Tuakoi Point (USNM). GILBERT ISLANDS: Apamama (USNM). FIJI ISLANDS: Bay of Islands, Suva Harbour, S. Viti Levu, 8 faths. (Hill coll.; Cernohorsky coll.); Viti Levu Bay, N.E. Viti Levu; Akuilau I., Nadi Bay, W. Viti Levu, 15 faths.; Caboni beach, N.E. Viti Levu (all Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.). SAMOA ISLANDS: outer reef at Apia, Upolu I.; Asili, Tutuila I.; Pago Pago (all USNM); Apia Harbour, Upolu I. (Cernohorsky coll.). COOK ISLANDS: (Clover coll.). SOCIETY ISLANDS: Ilot Tipaemano, Raiatea (USNM). LINE ISLANDS: Palmyra Island (USNM). HAWAIIAN ISLANDS: off Kewalo, Oahu (BPM). MIDWAY ISLANDS: (USNM).

Fossil records—PLIOCENE: Tjiidjow, Bantam, Java, Indonesia (type-locality of *M. idjowensis* and *M. subidjowensis* (Oostingh, 1939)).

Mitra ardjunoi Beets, 1941 (Pl. 344)

Range—Upper Miocene of Borneo, Indonesia.

Remarks—The species is similar to *M. fraga* Quoy & Gaimard, and has only more numerous spiral cords on the penultimate whorl. Beets separated *M. semari* from *M. ardjunoi* on the basis of more closely spaced spiral cords, and the presence of 1 or 2 more cords on the penultimate whorl. *M. semari* is a less mature individual of *M. ardjunoi* with a thin outer lip.

Measurements (mm)—

length	
30.0	Holotype of <i>semari</i>
29.3	Holotype of <i>ardjunoi</i>

Synonymy—

1941 *Mitra* (*Chrysame*) *ardjunoi* Beets, Verh. geol. Mijnb. Genoot. Ned. & Kolonien, geol. ser., vol. 13, no. 1, p. 112, pl. 6, figs. 232, 233 (Sungei Menkrawit, Mangkalihat, E. Borneo, Indonesia; U. Miocene).

1941 *Mitra* (*Chrysame*) *semari* Beets, ibid., p. 115, pl. 6, figs. 236, 237 (Sungei Menkrawit, Mangkalihat, E. Borneo, Indonesia; U. Miocene).

Mitra proscissa Reeve, 1844

(Color pl. 256, figs. 25-27; pl. 345)

Range—Gulf of Oman to China and the Fiji Islands.

Remarks—This species is similar to *M. cucumerina* Lamarck and *M. chrysalis* Reeve, but is larger in average size, less squat and ovate but rather elongate, with a more acuminate spire and with two of the spiral threads adjoining the sutures doubled up. The colour form *porcata* Reeve is more convex in outline, has a reddish-brown base colour with darker brown interspaces between cords, and a yellowish-white central band on the body whorl and occasionally narrow, white axial streaks. The typical form *proscissa* has slightly more subangulate whorls, the base colour is creamy-white or light grey and ornamentation

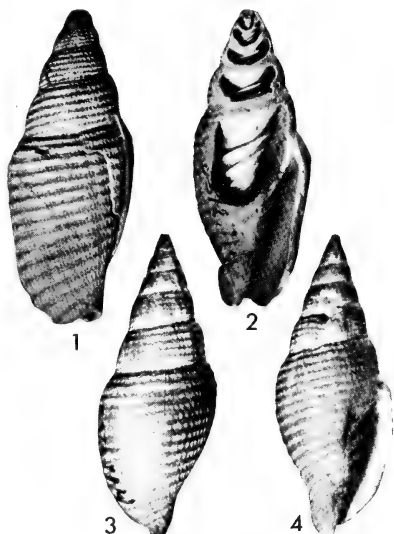


Plate 344. *Mitra* (*Nebularia*) *ardjunoi* Beets.

Figs. 1, 2. Type specimen of *M. (N.) ardjunoi* Beets from Sungei Menkrawit, Mangkalihat, U. Miocene of Borneo (from Beets, 1941, pl. 6, figs. 232, 233; 29.3 mm).

Figs. 3, 4. Type specimen of *M. semari* Beets from Sungei Menkrawit, Mangkalihat, U. Miocene of Borneo (from Beets, 1941, pl. 6, figs. 236, 237; 30.0 mm).

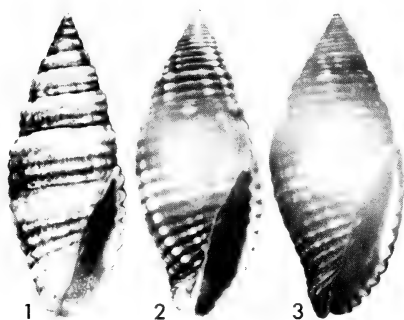
Plate 345. *Mitra (Nebularia) proscissa* Reeve.

Fig. 1. Lectotype of *M. (N.) proscissa* Reeve (BM (NH) 1967847; 37.2 x 14.2 mm).

Fig. 2. Syntype of *M. (N.) proscissa* Reeve (BM (NH) 1967847; 30.4 x 14.2 mm).

Fig. 3. Lectotype of *M. porcata* Reeve (BM (NH) 1967843; 30.2 x 13.2 mm).

consists of dark reddish-brown axial streaks and 2 nebulous, faint, broad bands on the body whorl. The latter form is more frequently encountered in India, but both forms are sympatric in Queensland, Australia. Reeve's 3 syntypes of *M. proscissa* consist of 1 typical specimen and 2 specimens of the *porcata* form.

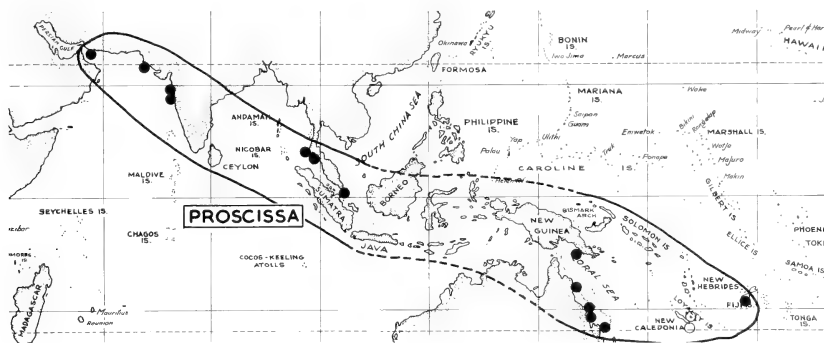
Habitat—On reefs, sometimes in muddy localities, under rocks and coral of the intertidal zone.

Description—Shell up to 38 mm (about 1½ inches) in length, elongate-ovate, moderately solid, sutures more distinct than in either *M. cucumerina* or *M. chrysalis*. Whorls 7-9, apart from 1½ smooth, conical nuclear whorls, first 2

post-nuclear whorls finely clathrate, latter whorls with narrow or moderately broad but shallow spiral grooves which give rise to flat or slightly elevated spiral cords; the cords number from 3-7 on the penultimate and from 14-22 on the body whorl. On the centre of the last whorl, the interspaces may become either very narrow and groove-like or as wide as the spiral cords themselves; the cords are less regular than in *M. cucumerina* or *M. chrysalis*, and at the suture 2 cords are doubled up, with the sutural cord finer and smaller in size. The spire whorls are either flat-sided and occasionally subangulate, or weakly convex and narrowly ledged at the sutures. The aperture is longer than the spire, very narrow and smooth within; the outer lip is elongate and regularly convex, crenulate at the margin, the columella is calloused and has from 3-5, generally 4, oblique folds. The siphonal fasciole is straight and the siphonal notch distinct. Reddish-brown in colour, ornamented with darker brown in the interspaces of the spiral cords, and with a faint or distinct yellowish-white central band on the body whorl, and sometimes narrow white axial streaks or a few small spots on the cords. Some individuals are creamy-white or very pale grey, ornamented with reddish-brown, slender axial streaks and darker interspaces, and 2 broad and nebulous, interrupted and ill-defined transverse bands on the body whorl; the aperture and columella are brown or greyish-brown. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
37.2	14.2	19.1	Lectotype of <i>proscissa</i>

Plate 346. Geographical distribution of *Mitra (Nebularia) proscissa* Reeve.

37.0	14.0	18.8	Bombay, India
32.0	13.3	18.0	Garner's Beach, Queensland
30.2	13.2	18.2	Lectotype of <i>porcata</i>
25.0	10.6	15.5	Singapore, Malaysia
16.4	8.0	11.0	Low Isles, Queensland

***Mitra tabanula* Lamarck, 1811**

(Color pl. 256, fig. 22; pl. 347)

Range—Gulf of Aden to Samoa and the Tonga Islands.

Remarks—*M. tabanula*, and the colour form *pediculus* with white spiral cords, have been separated as species on the sole basis of differences in the exterior colouring. Recent collections of *M. tabanula* in the New Hebrides, where the species is rather common, showed the colouring to be variable within a population of *M. tabanula* collected under the same coral rock. The white-corded form *pediculus* proved to be more common than the uniformly dark brown form, at a ratio of about 3:1. The two colour forms are sympatric in most localities throughout the species range, and the *pediculus* form was found to be more common in other localities.

Habitat—On reefs, under coral rocks and in crevices of coral, from the intertidal zone to a depth of 8 fathoms.

Description—Shell up to 20 mm (about $\frac{3}{4}$ inches) in length, roundly ovate to elongate-ovate, biconic and acuminate, spire sometimes slightly concave especially in young specimens, sutures weakly impressed. Whorls 6-8, apart from the protoconch of $1\frac{1}{2}$ -2 glassy, white or fawn nuclear whorls, spire whorls generally flat-sided and occasionally weakly subangulate at sutures; first post-nuclear whorls clathrate, later whorls with prominent, elevated and narrow spiral cords which number from 2-4 on the penultimate and from 9-15 on the body whorl. The interspaces of the cords are deep and "V"-shaped and sculptured with numerous, very fine and generally oblique axial striae. Aperture equal in height or longer than the spire, narrow and smooth within; outer lip thickened in mature individuals, regularly convex and with fluted crenulations at the margin. Columella glazed on the parietal wall, calloused anteriorly, and with 3-4 oblique folds; siphonal fasciole straight and slightly calloused, siphonal notch distinct. Blood-red, dark reddish-brown or purple-brown in colour, some specimens with pale, whitish spiral cords, tip of siphonal fasciole occasionally darker brown; aperture greyish-brown, columella reddish-brown, columellar folds pale in colour.

Measurements (mm)—

length	width	height of perture	
19.5	9.0	11.2	Bay of Islands, Fiji I.
14.4	7.3	8.4	Holotype of <i>palawanensis</i>
13.3	6.3	7.5	Lectotype of <i>tabanula</i>

Synonymy—

- 1844 *Mitra proscissa* Reeve, *Conchologia Iconica*, vol. 2, pl. 22, fig. 177 (no locality given).
 1844 *Mitra porcata* Reeve, *Conchologia Iconica*, vol. 2, pl. 24, fig. 188 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 12, pl. 23, fig. 517.
 1874 *Mitra proscissa* (sic) Reeve, Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 11, pl. 15, fig. 264 and pl. 16, fig. 282.
 1882 *Mitra (Chrysame) proscissa* (pars), Reeve, Tryon, *Manual Conchologie*, vol. 4, p. 147, pl. 43, fig. 259 only.
 1923 *Mitra (Chrysame) proscissa* var. *minor* Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, pl. 130 (Isle des Pins, New Caledonia and Lifu, Loyalty Islands) [non Wein-kauff, 1868].

Types—There are 3 syntypes of *M. proscissa* Reeve, in the British Museum (NH) no. 1967847; the specimen figured by Reeve in figure 177, is here designated as the lectotype of *M. proscissa*. The lectotype, here designated, and 2 juvenile syntypes of *M. porcata* are in the British Museum (NH) no. 1967843. No locality was given by Reeve, and we designate Bombay, India, as the type locality (specimens in USNM and Steiner coll.).

Records—GULF OF OMAN: Ras Jagin (Cernohorsky coll.). PAKISTAN: Karachi (USNM). INDIA: Bandina, N. of Bombay (USNM); Bombay (Steiner coll.). THAILAND: Ko Mai Thorn Island, Phuket, W. side of Phuket Island (both Cernohorsky coll.). MALAYSIA: W. side of Singapore Island (Steiner coll.). NEW GUINEA: Ela Beach, Port Moresby (Buick coll.). MARIANAS: Guam Id., Piti Bay, 20 ft. (Saltgaver, coll.). AUSTRALIA: QUEENSLAND: Garner's Beach (AIM; Powell coll.); Daydream Island, Whitsunday group; Low Isles (both Powell coll.); Girt Island, Keppel Bay (Eker coll.). NEW CALEDONIA: (Dautzenberg & Bouge, 1923). LOYALTY ISLANDS: (Dautzenberg & Bouge, 1923). FIJI ISLANDS: Cuvu Beach, S.W. Viti Levu (Cernohorsky coll.). CHINA: Xisha Id., Guangdong Prov. (Tchang Si, 1975).

Plate 347. *Mitra (Nebularia) tabanula* Lamarck.

Figs. 1, 2. Specimen from Manava Id., N. Viti Levu, Fiji Ids.; colour form with white spiral cords (WOC coll.; 14.6 x 7.6 mm).

Fig. 3. Holotype of *M. palawanensis* Bartsch from Brooke's Point, Palawan, Philippine Ids.; worn specimen (USNM 219051; 14.4 x 7.3 mm).

11.5	6.4	7.8	Malekula I., New Hebrides
10.0	5.5	5.6	Lectotype of <i>pediculus</i>

Synonymy—

- 1811 *Mitra tabanula* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 222 (Great Indian Ocean); 1833 Quoy & Gaimard, Voy. L'Astrolabe, vol. 2, p. 652, pl. 45, bis, figs. 10-13 (animal); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 60, pl. 9, fig. 27; 1845 Reeve, Conchologia Iconica, vol. 2, pl. 39, fig. 332; 1902 Shopland, Proc. Malac. Soc. London, vol. 5, p. 173; 1937 Peile, Proc. Malac. Soc. London, vol. 22, textfigs. 13, 14 (Radula); 1965 Cernohorsky, Veliger, vol. 8, p. 99, pl. 16, fig. 48, textfigs. 6, 6a; 1969, Revue Suisse Zoologie, vol. 76, p. 989, pl. 7, figs. 54a, b (figured lectotype).
- 1811 *Mitra pediculus* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 222 (Indian Ocean); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 55, pl. 16, fig. 53; 1845 Reeve, Conchologia Iconica, vol. 2, pl. 32, fig. 264; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 15, pl. 17, fig. 338; 1965 Cernohorsky, Veliger, vol. 8, p. 94, pl. 16, fig. 49; 1969, Revue Suisse Zoologie, vol. 76, p. 989, pl. 7, fig. 55 (figured lectotype).
- ?1829 *Mitra sulcata* Menke, Verz. Conchyl. Freih. Malsburg, p. 84 (no locality given) [non Swainson in Sowerby, 1825].
- 1874 *Mitra minor* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 12, pl. 28, fig. 662 (no locality given) [non Weinck, 1868].
- 1874 *Mitra spadicea* "Dunker", Sowerby, *ibid.*, p. 13, pl. 22, fig. 478 (S. Pacific) [non *Voluta spadicea* Gmelin, 1791 = *Mitra*].
- 1874 *Mitra trunculus* Sowerby, *ibid.*, p. 23, pl. 17, fig. 319 (no locality given).
- 1882 *Mitra (Chrysame) tabanula (pars)* Lamarck, Tryon, Manual Conchology, vol. 4, p. 146, pl. 42, figs. 243-245 only; 1895 Martin, Samml. geol. Reichs-Mus. Leiden, N.F., vol. 1, p. 75, pl. 11, figs. 169, 169a, b; 1915 Tesch in Wanner, Paläontologie von Timor, vol. 5, p. 44, pl. 29, figs. 95a, b.
- 1918 *Mitra palawanensis* Bartsch, Proc. Biol. Soc. Washington, vol. 31, p. 182 (Brooke's Point, Palawan, Philippine I.) [*pediculus* form].

Types—The lectotypes of *M. tabanula* Lamarck, no. 1102/85/1 and *M. pediculus* Lamarck, no. 1108/14, are in the Museum d'Histoire Naturelle, Geneva. The holotype and 1 paratype of *M. palawanensis* Bartsch, are in the National Museum of Natural History, Washington, no. 219051. The types of *M. sulcata*

Menke and the species described by Sowerby are missing. The type locality is Indian Ocean, which is here further restricted to Marudu Bay, North Borneo, Indonesia (specimens in USNM).

Nomenclature—Menke did not illustrate his *M. sulcata*, but his description of "shell yellow with white spiral cords" points to the *pediculus* form of *M. tabanula*.

Records—GULF OF ADEN: (Shopland, 1902). ZANZIBAR: (AMNH). MAURITIUS (MCZ). ANDAMAN ISLANDS: Port Blair (Steiner coll.). INDONESIA: Island off W. shore of Veecken Bay, S. Pagi I.; Marudu Bay, N. Borneo; Pulau Siburu, N. of Sipora, Sumatra (all USNM); N. side of Teluk Dodinga, near Ternate, Halmahera; S. end of Lalun I., S.W. of Kajao I., 0°05'S & 127°26'E; N. shore Warbal I., W. of Nuhu Rowa, Kai I. (all WAM). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.); near Cebu City, Cebu I. (USNM; Eker coll.); Davao, Mindanao; Catangan Bay, Dumurug Point, Mashate; Maricanan I., Luzon; Brooke's Point, Palawan I. (all USNM); Villaba, Leyte (Det. Mus. N.H.). MARIANAS: Saipan Island (USNM). MARSHALL ISLANDS: Dalap I., Majuro Atoll (USNM). PALAU ISLANDS: Kayangel Island (USNM). NEW GUINEA: Siassi Island (Hoskin coll.); Ela Beach, Port Moresby (Kleckham coll.); Moies Woendi, Schouten I. (USNM); N.E. end of Abroki, S.W. Marasbadi, Aori I., Geelvink Bay (Powell coll.). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Cernohorsky coll.); Pavuvu I., Russell Straits (USNM). NEW HEBRIDES: Little Malo Killi Killi, near Espiritu Santo (USNM); Meli I., S.W. Efate I.; Malapoa Point, Vila Harbour, Efate I.; Fila Island, Vila Harbour, Efate I.; Erakor lagoon, S.W. Efate I.; Pang reef, S.W. Efate I.; Ambryn Island (all AIM); Bushmens Bay, W. Malekula I. (Cernohorsky coll.). FIJI ISLANDS: Manava I., N. Viti Levu; Momi reef, V. Viti Levu; Bay of Islands, Suva Harbour, S. Viti Levu, 8 faths. (all Cernohorsky coll.). TONGA ISLANDS: Nuku alofa, Tongatabu (Cernohorsky coll.). SAMOA ISLANDS: Ofu, Manu'a group (USNM).

Fossil records—PLIOCENE: Tji Mantjeuri, Bantam, Java, Indonesia (K. Martin, 1895); between Noli Noli and Pene, Timor, Indonesia (Tesch in Wanner, 1915).

Mitra turgida Reeve, 1845

(Pl. 349)

Range—Gulf of Aden to Polynesia and the Hawaiian Islands.

Remarks—A small, ovate species which is easily recognized by its acuminate form, contracted

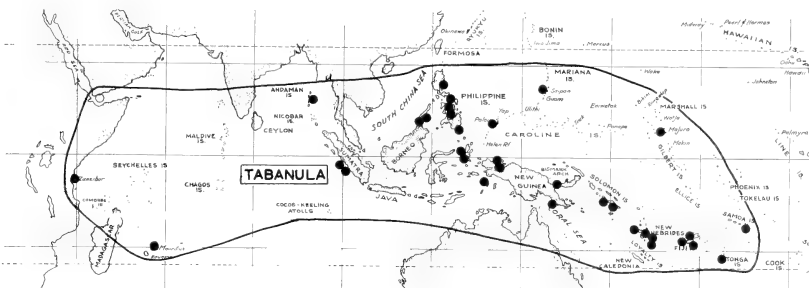


Plate 348. Geographical distribution of *Mitra (Nebularia) tabanula* Lamarck.

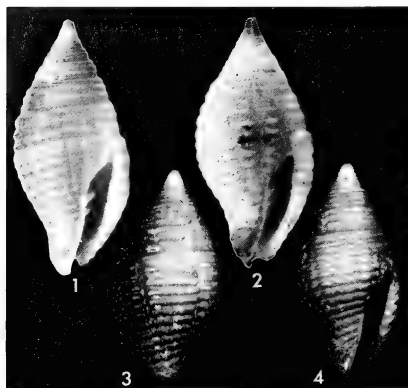
Plate 349. *Mitra (Nebularia) turgida* Reeve.

Fig. 1. Lectotype of *M. (N.) turgida* Reeve from Capul Id., Philippine Ids. (BM (NH) 1967901; 16.3 x 7.5 mm).

Fig. 2. Lectotype of *M. ericea* Pease from the Hawaiian Ids. (BM (NH) 1961161; 15.0 x 7.0 mm).

Figs. 3, 4. Specimen from Erakor lagoon, Efate Id., New Hebrides (WOC coll.; 12.3 x 6.0 mm).

base, narrowing aperture, regular cords, axial folds on the body whorl and a white protoconch.

Habitat—On reefs, under coral and in crevices of porous coral, in the intertidal zone.

Description—Shell up to 16 mm (about $\frac{3}{4}$ inches) in length, elongate-ovate but rather rotund, spire frequently concave, extremities acuminate, solid, sutures weakly impressed. Spire whorls 6-8, apart from a protoconch of $2\frac{1}{2}$ - $3\frac{1}{2}$ small, conical and glassy-white nuclear whorls; first 3 post-nuclear whorls minutely gemmate, later whorls sculptured with regular, elevated and narrow spiral cords. The cords number from 3-4 on the penultimate and from 11-17 on the body whorl. The spire-whorls are flat-sided but angulate at the sutures, body whorl with longitudinal, shallow grooves which produce irregular and wide-spaced axial folds which commence at the second sutural spiral cord and continue to the base; the spiral grooves are as broad or wider than the cords and are axially striate. Aperture equal in height or longer than the spire, very narrow and smooth within; outer lip thickened, regularly convex and crenulate at the margin in adult specimens. Columella calloused and with 3-4 oblique folds, siphonal fasciole straight or slightly recurved, siphonal notch deep. Tan to dark brown in colour, protoconch white, aperture and columella light greyish-brown.

Measurements (mm)—

length	width	height of aperture	
16.3	7.5	8.9	Lectotype of <i>turgida</i>
15.0	7.0	8.2	Lectotype of <i>ericea</i>
13.4	6.3	7.6	Momi reef, Fiji I.
12.4	6.0	6.5	Erakor reef, New Hebrides
10.8	4.8	5.2	Port Moresby, New Guinea
7.4	3.8	4.7	Malekula I., New Hebrides

Synonymy—

- 1845 *Mitra turgida* Reeve, *Conchologia Iconica*, vol. 2, pl. 33, fig. 273 (Island of Capul, Philippines); 1869 Pease, *Americ. Journal Conchology*, vol. 5, pt. 1, p. 85 (*M. ericea* synonymized with *M. turgida*); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 12, pl. 21, fig. 458; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 30; 1902 Shopland, *Proc. Malac. Soc. London*, vol. 5, p. 173.
- 1860 *Mitra ericea* Pease, *Proc. Zool. Soc. London*, p. 146 (Sandwich Islands = Hawaiian Islands); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 12, pl. 22, fig. 487; 1965 Kay, *Bull. Brit. Museum (Nat. Hist.)*, Zoology, Suppl. 1, p. 28, pl. 3, figs. 3, 4 (figured lectotype).
- 1880 *Mitra (Chrysame) turgida* Reeve, von Martens, *Beitr. Meeresf. Mauritius & Seychellen*, p. 252; 1882 Tryon, *Manual Conchology*, vol. 4, p. 144, pl. 42, figs. 234, 235; 1967 Orr-Maes, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 119, no. 4, p. 138, pl. 14, fig. C.
- 1965 *Mitra nucleolus* Lamarck, Cernohorsky, *Veliger*, vol. 8, p. 93, pl. 16, fig. 43 (non Lamarck, 1811).
- 1970 *Mitra (Nebularia) turgida* Reeve, Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 14, textfig. 62 (radula).

Types—The lectotype, here designated, and 2 syntypes of *M. turgida* Reeve, B.M. (NH) no. 1967901, and the lectotype and 1 paralectotype (designated by Kay, 1965) of *M. ericea* Pease, B.M. (NH) no. 1961161-62, are all in the British Museum (NH). The type locality is Capul Island, Philippine Islands.

Records—GULF OF ADEN: (Shopland, 1902). INDIAN OCEAN ISLANDS: Mauritius (von Martens, 1880); seaward reef at West Island and pass S. of Direction Island, Cocos-Keeling Islands (Orr-Maes, 1967). INDONESIA: Pulau Penju, S. of Sumatra; Marudu Bay, N. Borneo; W. shore Veeckens Bay, S. Pangli Island (all USNM). PHILIPPINE ISLANDS: Samar Island (Steiner coll.); JAPAN: Osimi, Osumi (USNM). NEW GUINEA: Ela beach, Port Moresby (Buick coll.; Cernohorsky coll.); Gaire (Buick coll.); Milne Bay (USNM). NEW HEBRIDES: Port Aneityum (USNM); Malapoa Point, Vila Harbour, Efate I.; Erakor reef, S.W. Efate I. (both AIM); Ure I., opposite E. coast of Malekula I.; Bushmens Bay, Malekula I. (both Cernohorsky coll.). MARSHALL ISLANDS: Debuu I., Kwajalein (DMNH); FIJI ISLANDS: Momi reef, W. Viti Levu; Viti Levu Bay, N.E. Viti Levu (both Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Cernohorsky coll.). SAMOA ISLANDS: Ofu, Manua group, Fagaitua, Tutuila I. (both USNM); Watson's Isle, Apia (Powell coll.); Tahina, Tutuila I. (DMNH). SOCIETY ISLANDS: Patutoa, Tahiti (USNM). TUAMOTU ISLANDS: (Garrett, 1880). HAWAIIAN ISLANDS: (Pease, 1860; Garrett, 1880).

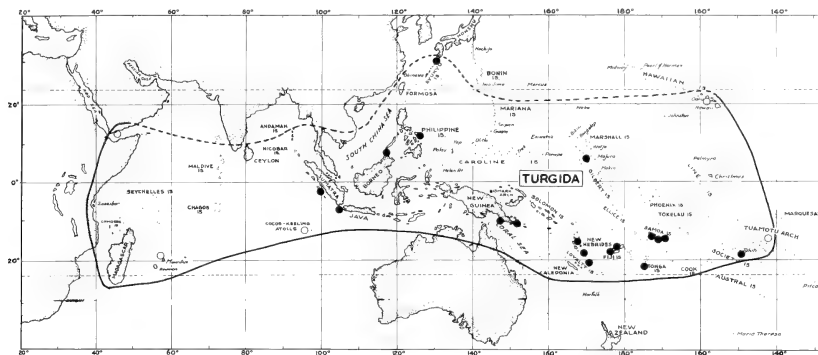


Plate 350. Geographical distribution of *Mitra (Nebularia) turgida* Reeve.

***Mitra avenacea* Reeve, 1845**
(Pl. 351)

Range—Madagascar to Ceylon to the Samoa Islands.

Remarks—The species is very closely related to *M. turgida* Reeve, but is more slender and fusiform, and lacks the acuminate spire, axial folds and basal granules on the body whorl. Dautzenberg and Bouge (1933) report the species from Tahiti, but we have not seen any specimens east of Samoa.

Habitat—Rarely under coral rocks, near sand, in the intertidal region, usually sublittoral to a depth of 32 fathoms.

Description—Shell up to 23 mm (about 1 inch) in length, fusiformly-elongate, moderately solid, sutures often hardly discernible and adpressed, very rarely weakly subangulate at the sutures. Whorls 6-8, apart from $2\frac{1}{2}$ -3 glassy-white, smooth nuclear whorls, first 3 post-nuclear whorls gemmate, later whorls sculptured with narrow and angulate spiral cords which number usually 3 on the penultimate and from 15-20 on the body whorl; in addition to the main three spiral cords, some specimens have 1-2 smaller, less elevated and adjacent cords on the penultimate whorl. The interstices of the cords are finely axially striate and there may be a few longitudinal grooves on the body whorl in some specimens, similarly to *M. turgida*. Aperture equal in height or longer than the spire, very narrow, smooth within, outer lip thickened, convex and crenulate at the margin, siphonal canal straight, siphonal notch distinct.

Orange-brown in colour, spiral cords usually paler, sometimes ornamented with white spots and streaks; aperture and columella flesh in colour, occasionally flushed with fawn or light brown. Faded specimens appear cream or yellow, and the spaces between the cords are orange.

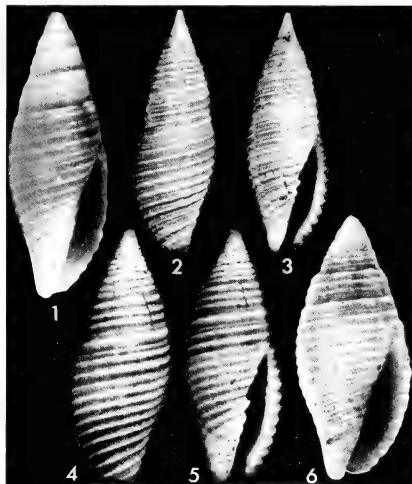


Plate 351. *Mitra (Nebularia) avenacea* Reeve.

Fig. 1. Syntype of *M. (N.) avenacea* Reeve from the Philippine Ids.; immature specimen (BM (NH) 1966712; 17.7 x 6.3 mm).

Figs. 2, 3. Specimen from Pasir Gendang, near Padang, Sumatra; slender form (USNM 655319; 16.3 x 5.5 mm).

Figs. 4, 5. Specimen from Cabra Id., Lubang Id., Mindoro, Philippine Ids.; intermediate form (USNM 653917; 11.1 x 4.5 mm).

Fig. 6. Holotype of *M. indentata* Sowerby; broad form (BM (NH) 1879.2.26.127; 13.7 x 5.8 mm).

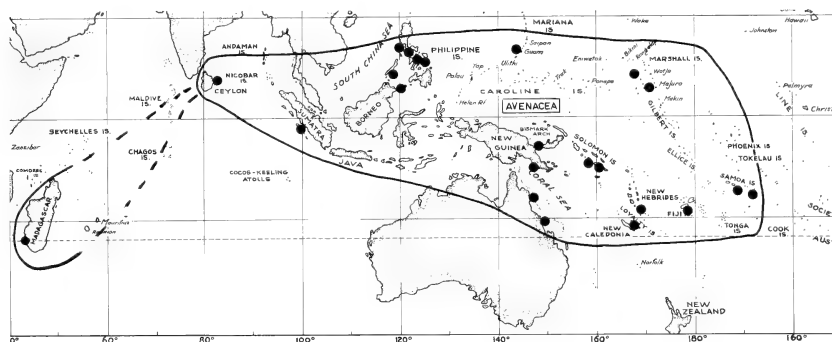


Plate 352. Geographical distribution of *Mitra (Nebularia) avenacea* Reeve.

Measurements (mm)—

length	width	height of aperture	
18.6	6.7	10.8	Lectotype of <i>avenacea</i>
16.3	5.5	7.9	Pasir Gendang, Sumatra
14.0	5.0	7.4	Ceylon
13.7	5.8	7.9	Holotype of <i>indentata</i>
11.0	4.2	6.2	Teuma Bay, New Hebrides
9.7	3.7	5.8	Holotype of <i>hanleyi</i>
9.0	3.4	5.3	off Tinakta I., Philippines

Synonymy—

- 1845 *Mitra avenacea* Reeve, *Conchologia Iconica*, vol. 2, pl. 31, fig. 246 (Islands of Burias, Ticao and Capul, Philippines);
 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 10, pl. 25, fig. 560.
 1874 *Mitra hanleyi* Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 12, pl. 28, fig. 661 (China Seas) [non Dohrn, 1861].
 1874 *Mitra indentata* Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 13, pl. 20, fig. 412 (no locality given). [broad specimen].
 1923 *Mitra (Chrysame) hanleyi* Sowerby, Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 123; 1933, *Journal de Conchyliologie*, vol. 77, p. 170.
 1970 *Mitra (Nebularia) avenacea* Reeve, Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 68, pl. 2, fig. 13.

Types—Three syntypes of *M. avenacea* Reeve, are in the British Museum (NH) no. 1966712, and the specimen which has been illustrated by Reeve, length 18.6 mm, but which has a small hole on the ventral side of the body whorl, is here selected as the lectotype. The holotype of *M. indentata* Sowerby, B.M. (NH) no. 1879.2.26.127, and the very worn holotype of *M. hanleyi* Sowerby (non Dohrn), B.M. (NH) no. 1900.3.9.34, are both in the British Museum (NH). Reeve cited three Philippine localities for his species, and the first-mentioned locality of Burias Island, Philippine Islands, is designated as the type locality.

Records—MADAGASCAR: Grand Récif, Tuléar, 10 metres (Inst. Ocean, Univ. Marseille). CEYLON: (USNM). INDONESIA: N. of Konirigine Baai, Pasir Gedang I., Sumatra (USNM). PHILIPPINE ISLANDS: off Tinakta, Tawi-Tawi group, 10 faths.; S.E. of Bantayan Island, 32 faths.; 15 mi. N. of Cabra Island; Brooke's Point, Palawan I.; Calatrava; Cebu; off Tacbuc Point, Leyte (all USNM); Boac, Merinduque (Lumawig coll.); Calapan, Mindoro (DMNH); Bauan, Batangas Bay (Cernohorsky coll.). MARIANAS: Guam Island (USNM). MARSHALL ISLANDS: Majuro Atoll; Kwajalein Atoll (both USNM). NEW GUINEA: Siassi Island (Hoskin coll.); Ela beach, Port Moresby (Buick coll.). AUSTRALIA: Queensland: Green Island; Shoal Point, Mackay (both USNM). SOLOMON ISLANDS: Pavuvu I., Russell Straits (USNM); Marau Sound, Guadalcanal (Gower coll.; Cernohorsky coll.). NEW HEBRIDES: Teuma Bay, S. Efate I. (Dale coll.); Meli I., S. Efate I. (Cernohorsky coll.). LOYALTY ISLANDS: Lifu (USNM). FIJI ISLANDS: Rat Tail Passage, Suva reef, S. Viti Levu (Cernohorsky coll.). SAMOA ISLANDS: Pago Pago, Tutuila (both USNM).

Mitra solanderi Reeve, 1844

(Pl. 353)

Range—Unknown.

Remarks—The holotype of *M. solanderi* is the only specimen on record and its origin is unknown. No other specimens have been seen in Museum, although some slender individuals of *M. proscissa* Reeve, bear a close resemblance to *M. solanderi*. The unique specimen is very worn and faded, more slender and fusiform than *M. proscissa* and has slightly wider spaced spiral cords; in other respects they are very similar. The penultimate whorl has 3 spiral cords and the body whorl 13, the interspaces are axially striate and the shell is off-white, ornamented with 2 broad, brown bands on the body whorl and the interspaces of the cords on some of the whorls are brown. The holotype specimen has been damaged during the life of the animal and repair scars are evident on the penultimate and the body whorl. The species could possibly be an atypical, slender form of *M. proscissa*.

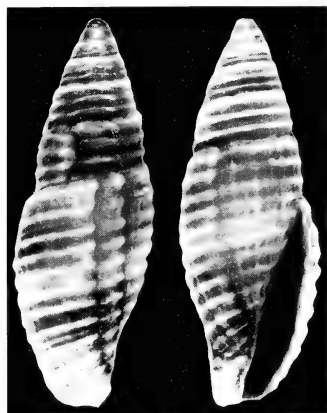


Plate 353. *Mitra (Nebularia) solanderi* Reeve. Holotype (BM (NH) 1967883; 29.2 x 10.4 mm).

Measurements (mm)—

length	width	height of aperture	
29.2	10.4	15.8	Holotype of <i>solanderi</i>

Synonymy—

1844 *Mitra solandri* Reeve, *Conchologia Iconica*, vol. 2, pl. 22, fig. 172 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 21, pl. 15, fig. 265.

1882 *Mitra (Chrysame) solandri (pars)* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 146, pl. 43, figs. 249, 250 only.

Types—The holotype of *M. solanderi* is in the British Museum (NH) no. 1967883.

Nomenclature—The species has been named by Reeve for Dr. Daniel Solander, and Reeve's incorrect original spelling has been emended by the writer (1965) to *solanderi*, but the species reported under this name from the Fiji Islands is not Reeve's species, but *Mitra (Nebularia) atjehensis* Oostingh.

Mitra doliolum Küster, 1839

(Color pl. 256, figs. 23, 24; pl. 354)

Range—Red Sea to Samoa and Tonga Islands.

Remarks—This moderately uncommon species is easily recognized by its reddish-orange colour and dark brown spiral grooves, rope-like, regular spiral cords and striate grooves. Dautzenberg & Bouge (1933) report the species from the Marquesas and Tuamotu Islands, but Garrett (1880) apparently did not find the species in East Polynesia; we have not seen any specimens east of Samoa.

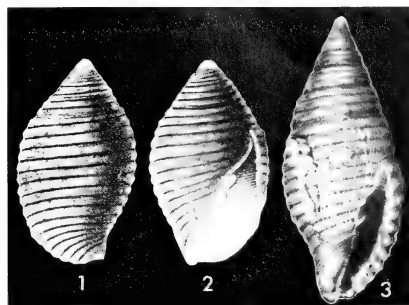


Plate 354. *Mitra (Nebularia) doliolum* Küster.

Figs. 1, 2. Lectotype figure of *M. (N.) doliolum* Küster from the East Indies; juvenile specimen (from Küster, 1839, pl. 17, figs. 2, 3).

Fig. 3. Lectotype of *M. rotundilirata* Reeve (BM (NH) 1967863; 22.6 x 9.6 mm).

Habitat—On reefs, in crevices and under coral rocks, from the intertidal zone to a depth of 8 fathoms.

Description—Shell up to 30 mm (about 1¼ inches) in length, elongate-ovate but sometimes rotund, spire acuminate, rather solid, sutures weakly impressed. Whorls 7-8½, apart from a protoconch of 2-2½, smooth, milky-white nuclear whorls, spire-whorls flat-sided or weakly convex and occasionally subangulate at the sutures; sculptured with elevated, moderately broad, close-set and rope-like spiral cords which number from 3-4 on the penultimate and from 14-18 on the body whorl. The spiral grooves are concave, narrow and axially lirate. Aperture equal in height or longer than the spire, narrow and smooth within; outer lip thickened, regularly convex and with scallop-like denticles at the margin. Columella calloused anteriorly, glazed on the parietal wall, and with 4-5 oblique folds; siphonal fasciole straight or slightly recurved, occasionally calloused, siphonal notch distinct. Orange-brown to reddish-brown in colour, faded specimens yellow or light orange, spiral grooves dark brown, protoconch white; aperture and columella light orange-brown. Periostracum very thin and translucent.

Measurements (mm)—

length	width	height of aperture	
28.8	13.0	15.8	Nuku'alofa, Tonga I.
22.6	9.6	11.4	Lectotype of <i>rotundilirata</i>
22.0	10.0	11.8	Natadola, Fiji I.

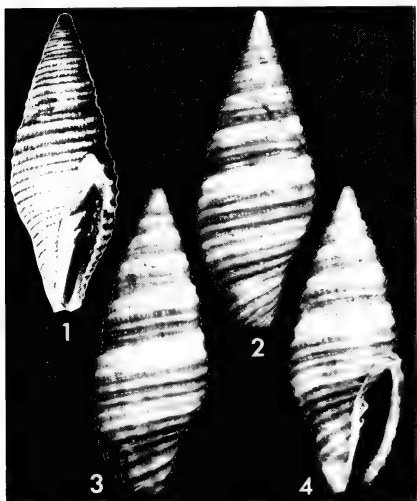


Plate 356. *Mitra (Nebularia) atjehensis* Oostingh.

Fig. 1. Holotype from North Atjeh, Goentji, Sawang, Pliocene of Sumatra (from Oostingh, 1939, pl. 11, fig. 197; 19.0 x 7.2 mm).

Fig. 2. Specimen from off Momi, W. Viti Levu, Fiji Ids., 15-17 fms. (WOC coll.; 14.5 x 5.4 mm).

Figs. 3, 4. Specimen from 20 mi. N. of Delambre Id., N.W. Australia, 23 fms. (WAM 600-71; 15.3 x 5.6 mm).

vated anteriorly, and with 3-4 oblique folds; siphonal fasciole straight or very slightly recurved, siphonal notch shallow. Cream to light fawn in colour, ornamented with 2 moderately broad, dark fawn or coffee-brown transverse bands on the body whorl and a single band on the spire whorls; in some individuals the brown bands are so broad that the shell has the appearance of being brown and banded with cream or light fawn. Aperture and columella light brown to orange-brown.

Measurements (mm)—

length	width	height of aperture	
25.5	10.0	13.9	New Hebrides
21.3	8.3	10.9	Momi, Fiji I.
19.0	7.2	10.5	Holotype of <i>atjehensis</i>
14.5	5.4	6.8	Momi, Fiji I.
14.0	5.8	6.8	Delambre I., W. Australia
9.0	3.7	4.9	Dimasalang, Philippines

Synonymy—

1939 *Mitra (Chrysamæ) atjehensis* Oostingh, Ingen. Nederl.-Indie, vol. 6, no. 4, p. 45, pl. 11, fig. 197 (N. Atjeh, jgoentji, Sawang, Sumatra; Pliocene).

1965 *Mitra solanderi* Reeve, Cernohorsky, Veliger, vol. 8, p. 97, pl. 16, fig. 46 (non Reeve, 1844).

Types—The type-specimen of *M. atjehensis* Oostingh, is probably in the Geological Museum, Bandoeng, Indonesia. The type locality is North Atjeh, Goentji, Sawang, Sumatra, Indonesia.

Records—THAILAND: Koh Chun, 30 fms. (ZMC). INDONESIA: 3-4 mi. W. of Tg. Lelar, Trangsan, Aru I., 6-8 faths. (WAM). PHILIPPINE ISLANDS: Dimasalang, Masbate (Cernohorsky coll.). FORMOSA: Kao-Hsiung, trawled in deep water (Cernohorsky coll.). N.W. AUSTRALIA: 20 mi. N. of Delambre Island, Dampier Archipelago, 23 faths.; Clarence Straits, S. of Bathurst Island, 28 faths.; S.W. of Dongar, 29°49'S & 112°24'E, 70-72 faths.; 170 mi. E.N.E. of Troughton Island, 45 faths. (all WAM). FIJI ISLANDS: off Momi lighthouse, W. Viti Levu, 15-17 faths. (Jennings coll.; Cernohorsky coll.); Wakaya Island near Ovalau Island (Powell coll.). NEW HEBRIDES: Mele Bay, Efate Id., 40 metres (Lepage coll.).

Fossil records—PLIOCENE: N. Atjeh, Goentji, Sawang, Sumatra, Indonesia (type-locality of *M. atjehensis* Oostingh).

Mitra maesta Reeve, 1845

(Pl. 358)

Range—Andaman Islands to the Admiralty Islands in Melanesia.

Remarks—A rare, sublittoral species which has a comparatively restricted distribution.

Habitat—On coral sand and mud, from 10 to 20 fathoms.

Description—Shell up to 21.0 mm (about ¾ inches) in length, only moderately solid, sutures very narrowly channeled and smooth. Whorls 8-9, apart from the protoconch, spire whorls convex and distinctly angulate and tabulated at the sutures; post-nuclear whorls sculptured with 3 flat spiral cords and axially striate grooves, axial striae

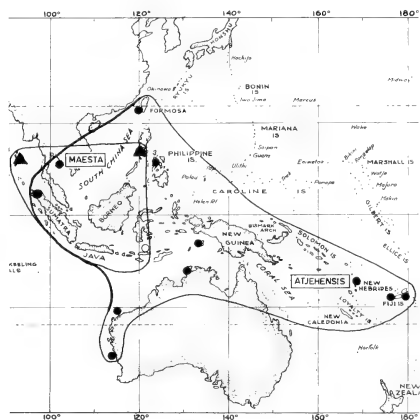


Plate 357. Geographical distribution of the species *Mitra (Nebularia) atjehensis* Oostingh, (solid circles) and *M. (N.) maesta* Reeve (triangles).



Plate 358. *Mitra (Nebularia) maesta* Reeve.

Fig. 1. Holotype from Corregidor Id., Philippine Ids., 10 fms. (BM (NH) 1967806; 14.9 x 6.1 mm).

Figs. 2, 3. Specimen from Port Blair, Andaman Ids. (WOC coll.; 16.5 x 6.3 mm).

Fig. 4. Syntype of *M. emiliae* Preston from Port Blair, Andaman Ids.; juvenile specimen (NMW; 21.0 x 7.4 mm).

Measurements (mm)—

length	width	height of aperture	
21.0	7.4	9.9	Syntype of <i>emiliae</i>
16.5	6.3	8.0	Port Blair, Andaman I.
14.9	6.1	7.9	Holotype of <i>maesta</i> Reeve

Synonymy—

1845 *Mitra maesta* Reeve, *Conchologia Iconica*, vol. 2, pl. 38, fig. 323 (Island of Corregidor, Philippines, 10 fathoms); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 11, pl. 26, fig. 595; 1879 E. A. Smith, *Proc. Zool. Soc. London*, for 1878, p. 813, pl. 50, fig. 13; 1913 Schepman, *Siboga-Expeditie*, vol. 49d, p. 268.

1882 *Mitra (Chrysame) maesta* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 143, pl. 42, fig. 226.

1908 *Mitra emiliae* Preston, *Rec. Indian Museum*, vol. 2, pt. 2, p. 193, pl. 17, fig. 68 (Andaman Islands); 1971 Adam, *Bull. Inst. Roy. Sci. Nat. Belg.*, vol. 47, no. 24, p. 23.

Types—The holotype of *M. maesta* Reeve, is in the British Museum (NH) no. 1967806. The holotype of *M. emiliae* Preston, is probably in the Indian Museum, Calcutta, but a syntype is in the National Museum of Wales, Cardiff, ex-Preston coll. (11-5-1907). The type locality of *M. maesta* is Corregidor Island, Philippine Islands.

Records—ANDAMAN ISLANDS: Port Blair (BMNH; NMW). INDONESIA: E. of Dangar Besar, Saleh Bay, 36 m (Schepman, 1913). PHILIPPINE ISLANDS: Corregidor Island, 10 faths. (BMNH). NEW BRITAIN: Rabaul (Parkinson, coll.).

Mitra suturata Reeve, 1845

(Color pl. 256, fig. 28; pl. 359)

Range—Indonesia to the Philippine Islands and China.

Remarks—This moderately rare deep water species is easily recognized by the narrowly excavated sutures, inflated, loosely-coiled and slanting post-nuclear whorls and granulose sculpture. The species illustrated by Kuroda & Habe (1971) as *M. suturata*, is the coarsely sculptured form of *Cancilla aegra* (Reeve).

Habitat—On a coral-rubble, mud, sand and clay substratum, from 20 to 170 fathoms.

Description—Shell up to 36 mm (about 1½ inches) in length, elongate-ovate, moderately light in weight, sutures narrowly channelled and excavated in some individuals. Whorls 6-8, apart from 1½-2 nipple-like nuclear whorls, spire whorls loosely coiled, regularly convex and rather long, first 2 postnuclear whorls generally slanting; sculptured with spiral cords which number from 6-7 on the penultimate and from 20-25 on the body whorl. Spiral grooves are narrow and pitted and the spiral cords are bisected by dense longitudinal striae which produce small and regular nodules

becoming obsolete on the last 3 whorls and the cords become less elevated. On the last 2 whorls, the spiral grooves are narrow and deeply incised and produce flat cords, which number from 1-4 on the penultimate and up to 16 on the body whorl; the cords sometimes become obsolete on the centre of the last 2 whorls, but in all specimens there is at least 1 or 2 sutural spiral cords which are prominent and more elevated. The aperture is slightly shorter or longer than the spire, narrow and smooth within, outer lip only moderately thickened, constricted anteriorly, and with small, weak, scalloped denticles at the margin; the columella is prominently calloused, callus becoming detached and margined anteriorly, columella with 3-4 oblique folds. Siphonal fasciole short, straight and corded, siphonal notch weak. Tan to brown in colour, spire whorls occasionally paler than the body whorl, tip of spire and siphonal fasciole occasionally darker brown; some individuals have 1-2 paler bands on the body whorl. Aperture and columella light brown, columellar folds paler in colour.

***Mitra vandervlerki* Beets, 1941**

(Pl. 361, figs. 1, 2)

Range—Upper Miocene of Borneo, Indonesia.

Remarks—The species is similar to the recent *M. suturata* Reeve, and has the same sculpture, slanting post-nuclear whorls, constricted base and produced siphonal fasciole. The species is, however, more slender, the sutures are not narrowly channeled and the aperture is shorter. The paratype figured by Beets on plate 6, figs. 243, 244, is probably a juvenile of *M. ardjunoi* Beets, rather than *M. vandervlerki*. The length of the holotype is 10.2 mm.

Synonymy—

1941 *Mitra* (*Cancilla*) *vandervlerki* Beets, Verh. geol. Mijnb. Genoot. Ned. & Kolonien, geol. ser., vol. 13, no. 1, p. 117, pl. 6, figs. 241, 242 only (Sungei Menkrawit, Mangkalihat, E. Borneo, Indonesia; U. Miocene).

***Mitra gerthi* Pannekoek, 1936**

(Pl. 361, fig. 3)

Range—Lower Miocene of Java, Indonesia.

Remarks—The description was based on broken specimens, and the illustrated holotype is a juvenile individual with an incomplete outer lip. The species bears some resemblance to juvenile *M. suturata* Reeve, and the condensed, translated description is as follows:

"Length 20.5 mm, width 7.0 mm, protoconch not preserved. The 8 weakly convex spire whorls carry 5 smooth spiral cords which are separated by coarsely, axially striate spiral grooves; these

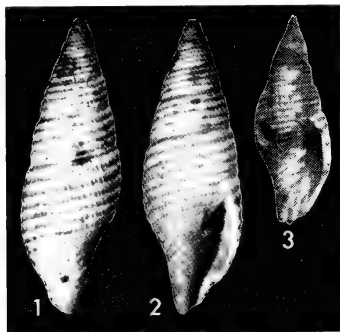


Plate 361. Figs. 1-2. *Mitra* (*Nebularia*) *vandervlerki* Beets Fig. 3. *M. (N.) gerthi* Pannekoek.

Figs. 1, 2. Holotype of *M. (N.) vandervlerki* Beets from Sungei Menkrawit, Mangkalihat, U. Miocene of Borneo (from Beets, 1941, pl. 6, figs. 241, 242; 10.2 mm).

Fig. 3. Holotype of *M. (N.) gerthi* Pannekoek from Ngampel, Rembang formation, L. Miocene of Java; immature specimen (from Pannekoek, 1936, pl. 1, fig. 16; 20.5 x 7.0 mm).

grooves are narrower than the cords on the early whorls, equal in width on later whorls and broader than the cords on the last whorl. The body whorl is constricted basally, the outer lip is missing and the columella has 5 strong folds which decrease in size anteriorly; the aperture is narrowly ovate and the siphonal canal is somewhat drawn out".

Synonymy—

1936 *Mitra* (*Cancilla*) *gerthi* Pannekoek, Geol. Inst. Meded. Univ. Amsterdam, no. 60, p. 36, pl. 1, fig. 16 (Ngampel, Rembang formation, Java, Indonesia, L. Miocene; type-specimen probably in Rijksmuseum, Leiden).

***Mitra kyaungonensis* Vredenburg, 1923**

(Pl. 362, figs. 1, 2)

Range—Miocene of Burma.

Remarks—This small, juvenile and badly preserved specimen bears a faint resemblance to juvenile specimens of *M. suturata*, but at the same time also resembles *Cancilla abyssicola* (Schepman) in sculpture; the author compared the species with *M. pelliserpentis* Reeve, which belongs in the subgenus *Strigatella*. No measurements were given by the author, but the figure indicates a length of 9.5 mm.

Synonymy—

1923 *Mitra* (*Chrysame*) *kyaungonensis* Vredenburg, Rec. Geol. Surv. India, vol. 54, p. 274, pl. 16, figs. 6a, b (Kyaungon, Burma, M. Miocene; holotype in the Geological Survey of India).

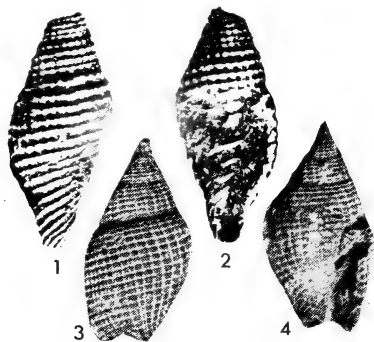


Plate 362. Figs. 1-2. *Mitra* (*Nebularia*) *kyaungonensis* Vredenburg. Kyaungon, M. Miocene of Burma (type figure from Vredenburg, 1923, pl. 16, figs. 6a, b; c. 9.5 mm).

Figs. 3, 4. *M. (N.) brachyspira* Cossmann and Pissarro. Leilan, Sind, Upper Ranikot formation, L. Eocene of India (type figure from Cossmann & Pissarro, 1909, pl. 3, figs. 31, 32; c. 12.0—15.0 mm x 5.5 mm).

Mitra brachyspira Cossmann and Pissarro, 1909

(Pl. 362, figs. 3, 4)

Range—Eocene of India.

Remarks—The description was based on an incomplete specimen which has a short, conical spire with feebly convex whorls which are separated by deep sutures; the sculpture consists of deeply incised spiral grooves and sinuous axial grooves of equal depth, which divide the whole surface into series of small rectangles. The columella has 5-6 oblique folds and the protoconch consists of 1½ smooth, globular nuclear whorls. The description of the globular protoconch, coupled with the general appearance of the shell, particularly the short spire and inflated shoulder of the body whorl, makes it doubtful that the species really is a mitrid, and not a *Conomitra* Conrad, 1865, in the family Volutomitridae. The dimensions of the type-specimen are length 12.0-15.0 mm, width 5.5 mm.

Synonymy—

1909 *Mitra (Cancilla) brachyspira* Cossmann & Pissarro, *Palaeontologia Indica Memoirs*, new ser., vol. 3, no. 1, p. 30, pl. 3, figs. 31, 32 (3 mi. E. of the old coal-pit near Leilan, Sind, U. Ranikot formation, India; L. Eocene).

Mitra sowerbyi subspecies**sowerbyi** Orbigny, 1852

(Pl. 363, figs. 1, 2)

Range—Lower Miocene of India.

Remarks—The species appears to be moderately frequent in Lower Miocene deposits of India. It is moderately ventricose, cylindrically-ovate, the body whorl is rather long and inflated, sutures distinct, sculptured with 5-8 moderately elevated, flat spiral cords on the penultimate and up to 23 cords on the body whorl; the spiral grooves are slightly narrower or broader than the cords and are finely axially striate. The aperture is narrow and elongate, usually longer than the spire, weakly convex and smooth within; the columella is calloused and has 4-5 oblique folds, the siphonal fasciole is straight and occasionally calloused and the siphonal notch is deep. A detailed diagnosis and discussion on the species may be found in Vredenburg (1925).

Measurements (mm)—

length

47.4 Lectotype of *sowerbyi*27.9 Paralectotype of *sowerbyi***Synonymy**—

1840 *Mitra fusiformis* J. de C. Sowerby in Grant, *Trans. Geol. Soc. London*, ser. 2, vol. 5, p. 329 and expl. to plates, pl. 26,



Plate 363. Figs. 1-2. *Mitra (Nebularia) sowerbyi sowerbyi* Orbigny Figs. 3-6. *M. (N.) sowerbyi sedanensis* K. Martin Figs. 7, 8. *M. (N.) sowerbyi kingae* Cernohorsky.

Fig. 1. Holotype of *M. (N.) sowerbyi sowerbyi* Orbigny from Soomrow, Gaj of Kachh, L. Miocene of India (from J. de C. Sowerby, 1840, pl. 26, fig. 24; 47.4 mm).

Fig. 2. Specimen from Quilon, Kerala, Miocene of India (from Dey, 1962, pl. 4, fig. 17).

Figs. 3, 4. Holotype of *M. (N.) sowerbyi sedanensis* K. Martin from Sedan, Rembang beds, L. Miocene of Java (from K. Martin, 1906, pl. 44, fig. 720; c. 39.0 mm).

Figs. 5, 6. Holotype of *M. bayeri* Beets from Sungei Menkrawit, Mangkalihat, U. Miocene of Borneo (from Beets, 1941, pl. 9, figs. 369, 370; 20.0 mm).

Figs. 7, 8. Holotype of *M. (N.) sowerbyi kingae* Cernohorsky from Wasir Id., W. Wokam, Aru Ids., Indonesia (WAM 84/1; 34.6 x 12.2 mm).

fig. 24 (Soomrow, Cutch, Gaj beds, India; L. Miocene) [non *M. fusiformis* Borson, 1820].

1852 *Mitra sowerbyi* Orbigny, Prodr. Paléont. strat. Universelle, vol. 3, p. 54 (substitute name for *M. fusiformis* J. de C. Sowerby, 1840).

1923 *Mitra (Chrysamæ) sowerbyi* Orbigny, Vredenburg, Rec. Geol. Surv. India, vol. 54, pt. 3, p. 271; 1925, Mem. Geol. Surv. India, vol. 1, pt. 1, p. 150; 1962 Dey, Mem. Geol. Surv. India, new ser., vol. 36, p. 86, pl. 4, figs. 16, 17.

?1939 *Mitra (Chrysamæ) cf. sowerbyi* d'Orbigny, Mukerjee, Mem. Geol. Surv. India, new ser., vol. 28, Mem. no. 1, p. 67.

Types—The 2 syntypes of *M. sowerbyi* d'Orbigny, are in the Department of Palaeontology, British Museum (NH); the larger specimen figured by Sowerby in the left hand figure, no. G-10056, is designated as the lectotype, and the smaller specimen no. 10057, as the paralectotype of *M. sowerbyi*. The type locality is Soomrow, Kachh, Gaj beds, India, L. Miocene.

Records—L. MIOCENE: Gaj of Kachh, N. W. India (Vredenburg, 1923); Tyra River, near Rampur, Gaj of Kachh (Vredenburg, 1925); Quilon, Kerala, India (Dey, 1962); ? Bagmara, Garo Hills, Assam, N.E. India (Mukerjee, 1939).

***Mitra sowerbyi* subspecies
sedanensis K. Martin, 1906**

(Pl. 363, figs. 3-6)

Range—Miocene of Indonesia.

Remarks—The Indonesian subspecies is similar in form and features to the Indian Miocene subspecies *sowerbyi*, but differs in features of finer sculpture. The spiral cords are less elevated and slightly more numerous on the body whorl, the spiral grooves are sharply incised and narrower than in the Indian *sowerbyi*. The figured type-specimen of *M. sedanensis* is not fully mature whereas the type-specimen of *M. bayeri* Beets, is more adult.

Measurements (mm)—

length

39.0 From type figure of *sedanensis*
20.0 Holotype of *bayeri*

Synonymy—

1906 *Mitra (Nebularia) sedanensis* Martin, Samml. geol. Reichs-Mus. Leiden, N.F., vol. 1, pt. 10, p. 303, pl. 44, figs. 720, 720a, b (Sedan and G. Butak, Rembang beds, Java, L. Miocene; type-specimen in Rijksmuseum, Leiden).

1914 *Mitra* sp. Martin, Samml. geol. Reichs-Mus. Leiden, ser. 1, vol. 9, p. 330 (according to Beets, 1941).

1916 *Mitra (s. str.) sedanensis* Martin, Samml. geol. Reichs-Mus. Leiden, vol. 2, pt. 6, p. 234; 1931 van der Vlerk, Leidsche geol. Meded., vol. 5, p. 226.

1941 *Mitra (Chrysamæ) bayeri* Beets, Verh. geol. Mijnb. Genoot. Ned. & Kolonien, vol. 13, no. 1, p. 112, pl. 9, figs. 368-374 (Sungei Menkrawit, Mangkalihat, E. Borneo, Indonesia; U. Miocene).

Records—LOWER MIOCENE: Sedan and G. Butak, Rembang formation, Java (Martin, 1906); Gunung Spolog, Kembang Sokkoh, W. Progo beds, Java (Martin, 1916); Njalindoeng beds, Java (van der Vlerk, 1931). U. MIOCENE: Central Sumatra (van der Vlerk, 1931); Gelingsch formation, E. Borneo; Mangkalihat, Menkrawit beds, E. Borneo (Beets, 1941).

***Mitra sowerbyi* subspecies
kingae Cernohorsky, 1972**

(Pl. 363, figs. 7, 8; pl. 364)

Range—Indonesia to northwestern Western Australia.

Remarks—The recently described living subspecies of *sowerbyi* is known from one live-taken specimen collected by the "Mariel King Memorial Moluccas Expedition 1970" in Indonesia, and one adult and one juvenile from northwest Australia. It is similar in appearance to the ancestral Indonesian Miocene subspecies *sowerbyi sedanensis* K. Martin, but differs in features of less convex whorls, coarser sculpture, broader interstices and stronger, closer set columellar folds.

Habitat—On sand and shell-rubble substratum, from 18 to 22 fathoms.

Description—Shell up to 35 mm (about 1½ inches) in length, elongate-ovate and slightly cylindrical, solid, sutures moderately impressed. Whorls 6½, apart from glassy-white nuclear whorls, first 2 post-nuclear whorls slightly convex, later whorls flat-sided, body whorl slightly inflated anteriorly to the suture. Sculptured with fairly regular, flat and feebly elevated spiral cords which number 7 on the penultimate and 29 on the body whorl; the longitudinal sculpture consists of fine, crowded axial striae which override the spiral cords and produce axial lirae and intervening pits in the moderately narrow grooves. Aperture longer than the spire, narrow and smooth within; outer lip thickened and minutely crenulate, regularly convex, columella calloused and with 4-5 prominent, oblique folds. Siphonal canal straight, siphonal notch distinct. Off-white to cream in colour, spiral cords dark reddish-brown, colouring interrupted in places by white longitudinal



Plate 364. *Mitra (Nebularia) sowerbyi kingae* Cernohorsky. Half-row of radula. Wasir Id., W. Wokam, Aru Ids., Indonesia, 18-22 fms.

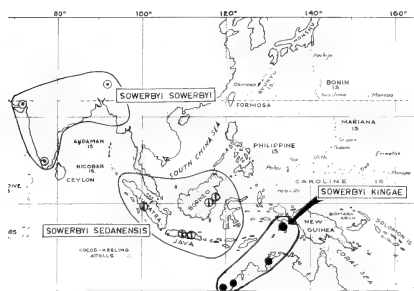


Plate 365. Geographical distribution of *Mitra (Nebularia) sowerbyi sowerbyi* Orbigny, and its subspecies, *M. (N.) sowerbyi sedanensis* K. Martin, and *M. (N.) sowerbyi kingae* Cernohorsky.

growth striae; in western Australian specimens the brown colour is sometimes confluent and gives the shell a two-banded appearance. Aperture and columella porcellaneous-white, first 2 post-nuclear whorls white. The radula is typically mitrine, but very small and only 7.2% of shell-length.

Measurements (mm)—

length	width	height of aperture	
34.6	12.2	19.8	Holotype of <i>kingae</i>
26.6	10.8	16.7	Onslow, N.W. Australia

Synonymy—

1972 *Mitra (Nebularia) sowerbyi kingae* Cernohorsky, Rec. Auckland Inst. Museum, vol. 9, p. 195, figs. 1-2, 6.

Types—The holotype of *M. sowerbyi kingae* is in the Western Australian Museum, Perth, no. 84/1. The type locality is off west coast of Wasir Island, West Wokam, Aru Ids., Moluccas, Indonesia, 5°30'S & 134°12'E, in 18-22 fathoms.

Records—INDONESIA: W. coast of Wasir Id., West Wokam, Aru Ids., Moluccas (WAM). WESTERN AUSTRALIA: Onslow (M. Marrow coll.); Shark Point, Barrow Id., 20°53'S & 115°22'E (WAM); near Darwin, Arafura Sea, Northern Territory (ANSP).

***Mitra molengraaffi* K. Martin, 1916**
(Pl. 366)

Range—Miocene of Indonesia.

Remarks—The author compared his species with *M. sowerbyi sedanensis* Martin, which was differentiated by the more acuminate spire and slender protoconch; other differences cited by



Plate 366. *Mitra (Nebularia) molengraaffi* K. Martin.

Figs. 1, 2. Holotype and paratype from Kembang Sokkoh, W. Progo beds, L. Miocene of Java (from K. Martin, 1916, pl. 1, figs. 21, 23; fig. 2 = holotype, 36.0 mm; fig. 1 = paratype 19.0 mm).

Figs. 3, 4. Holotype of *M. mitrai* Beets from Sungai Menkrawit, Mangkalihat, U. Miocene of Borneo, immature specimen (from Beets, 1941, pl. 6, figs. 234, 235; 30.0 mm).

Martin were the slightly more curved columella, more distinct siphonal notch and the arrangement of the spiral threads in *M. molengraaffi*. The species is indeed very similar to *M. sowerbyi sedanensis*, and was considered to be hardly separable from *M. sowerbyi*, by Dey (1962). *M. mitrai* Beets, is an immature and therefore broad individual with a thin and as yet undeveloped outer lip. It was separated by the author from *M. molengraaffi* because it was more subangulate at the sutures in profile and had 1 less columellar fold.

Measurements (mm)—

length	
36.0	Holotype of <i>molengraaffi</i>
30.0	Holotype of <i>mitrai</i>

Synonymy—

1916 *Mitra (s. str.) molengraaffi* Martin, Samml. geol. Reichs-Mus. Leiden, N.F., vol. 2, pt. 6, p. 234, pl. 1, figs. 21-23 (Kembang Sokkoh, West Progo beds, Java, L. Miocene; type-specimen in Rijksmuseum, Leiden).

1941 *Mitra (Chrysame) mitrai* Beets, Verh. geol. Mijnb. Ned. & Kolonien, vol. 13, no. 1, p. 114, pl. 6, figs. 234, 235, 245 (Sungei Menkrawit, Mangkalihat, E. Borneo; U. Miocene).

***Mitra rosacea* Reeve, 1845**

(Color pl. 256, figs. 29-32; pl. 367)

Range—Thailand to N.W. Australia and north to Japan.

Remarks—This sublittoral species was considered endemic to Japan, but subsequent collecting placed the species on record from as far west as Thailand.

Habitat—In sand and mud, from 3 to 70 fathoms.

Description—Shell up to 37 mm (about 1½ inches) in length, elongate-ovate and slightly cylindrical, moderately light in weight, last whorl long and slightly inflated, sutures prominent. Whorls 5½-7, apart from the protoconch, spire whorls convex and gradually increasing in size anteriorly, sculptured with thin, slightly elevated spiral cords which are divided into laterally oriented fillets by longitudinal grooves; the spiral threads number from 5-10 on the penultimate and from 24-40 on the body whorl. The spiral grooves are concave and considerably broader than the threads and carry an additional sculpture of fine intermediate spiral striae and macroscopic axial lines. Aperture longer than the spire, narrow and smooth within, outer lip only moderately thickened, elongated and weakly convex and scalloped at the margin; columella calloused, callus thin on the parietal wall, columella with 4-6 wide-spaced

and oblique folds. Siphonal fasciole straight and occasionally calloused, siphonal notch distinct. Cream in colour, frequently flushed with rose, some spiral fillets occasionally spotted with brown; some individuals have two faint or distinct, broad, dark rose or reddish-brown bands on the body whorl. Aperture and columella occasionally flushed with light pinkish-violet or rose.

Measurements (mm)—

length	width	height of aperture	
36.4	13.6	23.0	Rawai reef, Thailand
35.6	13.6	22.0	Laminusa, Philippines
33.1	11.7	21.0	Boac I., Philippines
30.6	12.2	19.7	Off Isshiki, Japan
27.0	11.0	17.0	Holotype of <i>hirasei</i>
19.8	7.3	12.2	Lectotype of <i>rosacea</i>
17.4	7.1	11.0	N. of Pt. Cloates, W. Australia
16.6	6.2	10.6	Aru Id., Indonesia
10.0	3.8	6.3	Rottneet Id., W. Australia
8.6	3.6	x 5.4	Lectotype of <i>reticulata</i>

Synonymy—

1845 *Mitra rosacea* Reeve, *Conchologia Iconica*, vol. 2, pl. 38, fig. 321 (Island of Corregidor, Philippines); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 9, pl. 8, fig. 111; 1970 Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 13, pl. 2, fig. 5 (shells), textfigs. 50, 51 (radula).

1853 *Mitra reticulata* A. Adams, *Proc. Zool. Society London*, for 1851, p. 136 (Port Essington, N. Australia, 7 fathoms) [non d'Orbigny, 1850].

1882 *Mitra (Cancilla) annulata (pars)* Reeve, Tryon, *Manual*

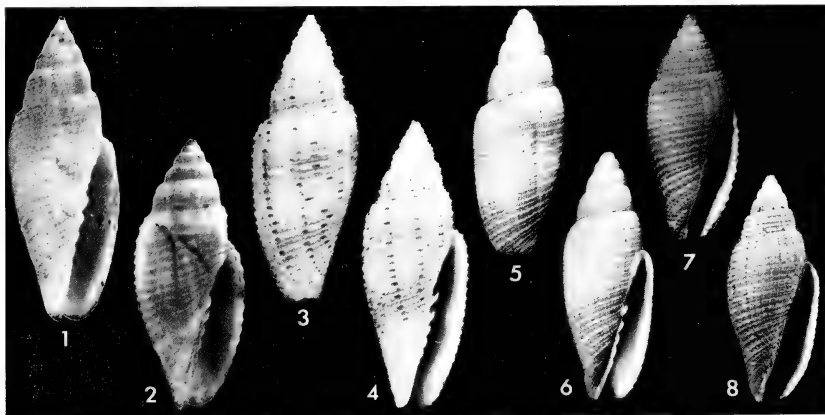


Plate 367. *Mitra (Nebularia) rosacea* Reeve.

Fig. 1. Lectotype from Corregidor Id., Philippine Ids.; immature specimen (BM (NH) 1967861; 19.8 x 7.3 mm).

Fig. 2. Syntype from Corregidor Id., Philippine Ids.; immature specimen (BM (NH) 1967861; 17.8 mm).

Figs. 3, 4. Specimen from W. of Tg Lelar, Trangan, Aru Ids., Indonesia, 6-8 fms.; immature specimen (WAM; 16.6 x 6.2 mm).

Figs. 5, 6. Specimen from Siasi, Sulu, Philippine Ids.; adult specimen (Dan coll.; 35.6 x 13.6 mm).

Fig. 7. Lectotype of *M. reticulata* A. Adams from Port Essington, Northern Territory, Australia, 7 fms.; juvenile specimen (BM (NH) 196730; 8.6 x 3.6 mm).

Fig. 8. Specimen from Point Cloates, N.W. Australia; juvenile specimen (WAM 22670; 17.4 x 7.1 mm).

- Conchology, vol. 4, p. 141, pl. 41, fig. 208 only (non Reeve, 1844).
- 1904 *Mitra hirasei* Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 56, p. 12, pl. 3, figs. 21, 21a (Hirado, Hizen, Japan); 1966 Cernohorsky, Veliger, vol. 9, p. 109, textfig. 15 (radula).
- 1936 *Mitra (Scabricola) hirasei* Pilsbry, Hirase, Coll. Japanese shells, p. 70, pl. 100, fig. 15; 1963 Shikama, Select. shells world in colour, vol. 1, pl. 74, fig. 2; 1965 Azuma, Venus; Japanese Journ. Malacology, vol. 23, no. 4, p. 180, textfig. 5 (radula).
- 1964 *Scabricola hirasei* (Pilsbry), Habe, Shells west. Pacific in colour, vol. 2, p. 107, pl. 34, fig. 9.
- 1971 *Nebularia rosacea* (Reeve), Kuroda & Habe, Sea shells Sagami Bay, p. 187, pl. 52, fig. 11.

Types—The lectotype, here designated, and 2 syntypes of *M. rosacea* Reeve, B.M. (NH) no. 1967861, and the lectotype, here selected, and 4 syntypes of *M. reticulata* A. Adams, BM(NH) no. 196730, are in the British Museum (NH). The holotype of *M. hirasei* Pilsbry, could not be found in the Academy of Natural Sciences, Philadelphia. The type locality of *M. rosacea* is Corregidor Island, Philippine Islands.

Nomenclature—The species was previously known under the name *M. hirasei* Pilsbry, and has been usually assigned to the subgenus *Scabricola* Swainson. It was found, however, that *M. rosacea* Reeve, is a prior name for the species and that the geographical distribution is considerably wider than originally presumed. The radula of the species is mitrine and an assignment to *Nebularia* appears more appropriate, especially since the species shows some affinity with the *soverbyi* group of species.

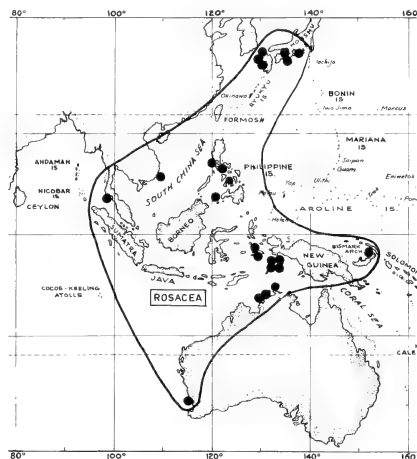


Plate 368. Geographical distribution of *Mitra (Nebularia) rosacea* Reeve.

Records—THAILAND: Rawai reef, Phuket (Orr coll.; Cernohorsky coll.). NEW GUINEA: Rabaul, New Britain (Parkinson coll.). INDONESIA: Saparoea Bay, 10 faths. (ZMC); 3-4 mi. W. of Tg Lelar, Trangan, Aru Id., 6°46'S & 133°58'E, 6-8 faths.; off Tg Tutuhuhur, Piru Bay, Ceram Id., 14-26 faths.; between Warbal and Ur Id., W. of Nuhu Rowa, Kai I., 35-40 faths.; 3 mi. N.W. of Tg Tuwan, Selaru, Tanimbar, W. of Babi I., Wokam, Aru I., W. of Tg Derehi, Trangan, Aru I. (all WAM). AUSTRALIA: N.W. Australia: 170 mi. E.N.E. of Troughton Island, 45 faths.; W. end of Rottnest Island, 70 faths.; Clarence Straits, S. of Bathurst I., 28 faths.; N.W. of Charles Point, 18 faths. (all WAM). Northern Territory: Port Essington, 7 faths. (BMNH). PHILIPPINE ISLANDS: Cebu: Subic Bay, Luzon (both DMNH); Boac, Marinduque (Lumawig coll.; Powell coll.); Siasi, Sulu Sea, 3-5 faths. (Clover coll.; DMNH; Cernohorsky coll.); Laminusa, Siasi, Sulu Sea (Dan coll.). VIETNAM: Dang, S. coast of Vietnam (Cernohorsky coll.). JAPAN: Hirado, Hizen, Kii; Nagasaki (all USNM); Misaki, 25 faths.; Hyatori Maru, 33°51'N & 130°03'E, 26 faths. (both ZMC); Kiushiu Island; off Isshiki, Mikawa, 30 faths. (both DMNH; Cernohorsky coll.).

Mitra rubiginosa Reeve, 1844

(Color pl. 256, figs. 33, 34; pl. 369)

Range—Thailand to West Australia, the Philippine Islands and New Britain.

Remarks—*Mitra rubiginosa* is related to the *soverbyi* group of species, and although already known to Chemnitz in 1795, who considered it a variety of *Pterygia scabricula* (Linnaeus), the species was not named until 50 years later by Reeve.

Habitat—On reefs, under rocks and near crevices, from the intertidal zone to a depth of 10 fathoms.

Description—Shell up to 50 mm (2 inches) in length, fusiformly-ovate, moderately solid, sutures distinct and with numerous small crenulations which number up to 60 on the body whorl.

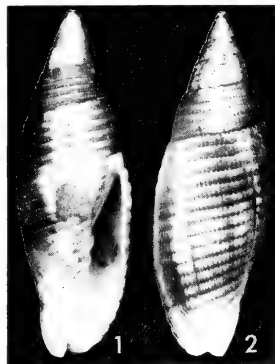


Plate 369. *Mitra (Nebularia) rubiginosa* Reeve.

Fig. 1. Lectotype (BM (NH) 1967866; 38.3 x 13.0 mm).

Fig. 2. Syntype (BM (NH) 1967866; 37.5 x 13.2 mm).

Whorls 7-8, apart from an eroded protoconch, spire whorls almost flat-sided or weakly convex, sculptured with spiral grooves which are either shallow or weakly concave and give rise to flat or feebly elevated spiral cords which are generally broader than the grooves; grooves number from 5-7 on the penultimate and up to 15 on the body whorl, apart from a dozen close-set and oblique basal cords. Longitudinal striae cover the shell surface, becoming obsolete on the spiral cords but prominent in the grooves, and protrude slightly past the sutures causing minute sutural crenulations; in specimens with narrow spiral grooves the axial lirae appear only as small pits. Aperture longer than the spire, elongate, narrow and smooth within, outer lip only moderately thickened, regularly convex and with scallop-like denticles at the margin; columella calloused, callus more prominent anteriorly but thinner on the parietal wall, and with 4-6 oblique folds. Siphonal fasciole straight or slightly recurved and generally calloused, siphonal notch prominent. White to creamy-white in colour, ornamented with broad, rusty-brown axial flames which are interrupted on the centre of the body whorl and form 2 broad transverse bands; some individuals are predominantly rusty-brown and ornamented with creamy-white axial flames and growth-marks. The aperture and columella are cream in colour.

Measurements (mm)—

length	width	height of aperture	
47.5	14.0	26.0	Ko Pippi I., S.W. Thailand
38.3	13.0	23.2	Lectotype of <i>rubiginosa</i>
38.1	11.5	20.8	Syntype of <i>rubiginosa</i>
38.0	12.5	22.5	Eaglehawk I., W. Australia
32.0	10.7	19.0	Marinduque I., Philippines
30.4	9.8	18.0	Boac I., Philippines

Synonymy—

1795 "*Voluta scabricula* Linnaei" Chemnitz, Syst. Conchylien-Cabinet, vol. 11, p. 28, pl. 178, figs. 1729, 1730 (non binomial).

1844 *Mitra rubiginosa* Reeve, Conchologia Iconica, vol. 2, pl. 10, fig. 68 (Island of Ticao, Philippines); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 11, fig. 167; 1882 Tryon, Manual Conchology, vol. 4, p. 119, pl. 35, fig. 54.

Types—The lectotype, here designated, and 2 syntypes of *M. rubiginosa* Reeve, are in the British Museum (NH) no. 1967866. The type locality is Ticao Island, Philippine Islands.

Records—THAILAND: Ko Pippi I., Phuket, 2-3 faths. (Cernohorsky coll.). INDONESIA: Keledjitan, Bantam, Java (USNM). PHILIPPINE ISLANDS: Cebu Island; off Tinakta I., Tawi Tawi group, 10 faths. (both USNM); Ticao Island (AMNH); Marinduque I., Luzon (Clover coll.); Luzon (Sealey coll.); Salanguin Bay, S.W. Luzon, 2 faths. (Bibbey coll.); Boac, Marinduque (DMNH); Lumawig coll.). WEST AUSTRALIA: Eaglehawk I., Dampier Archipelago; S.W. of Point Cloates, 23°25'S & 113°14'E (both WAM). NEW BRITAIN: Rabaul (AMNH).

Mitra pyramis (Wood, 1828)

(Pl. 371)

Range—Mauritius to the Tonga Islands.

Remarks—This is one of the rare species of Mitridae, and apart from the 2 type-specimens we have seen only 6 additional specimens. *M. cancellata* Swainson and *M. pyramis* (Wood), have been described from a very worn individual in which the axial riblets are worn flat, while *M. loricata* Reeve, was described from a fresh specimen with a crisp sculpture of axial riblets and spiral grooves.

Habitat—Unknown, but probably sublittoral.

Description—Shell up to 50 mm (2 inches) in length, fusiformly-elongate, body whorl slightly inflated, solid, sutures narrowly ledged and finely crenate. Whorls 8-9 inclusive of a worn protoconch, first 3-4 post-nuclear whorls flat-sided and last 3 whorls convex, sculptured with slender and rounded axial riblets which number from 25-30 on the penultimate and from 30-45 on the body whorl, riblets rendered granulose through bisecting and moderately deep spiral grooves;

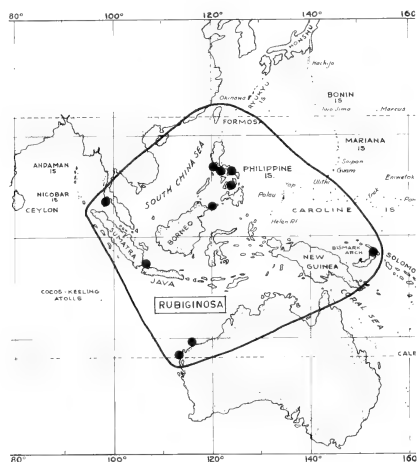


Plate 370. Geographical distribution of *Mitra* (*Nebularia*) *rubiginosa* Reeve.

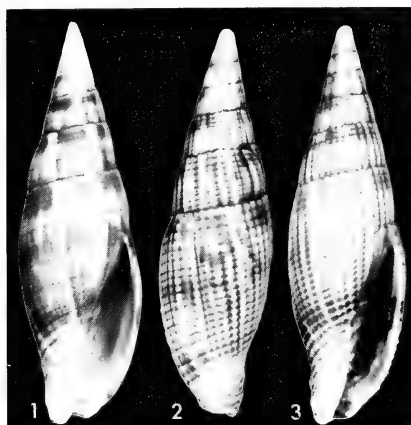


Plate 371. *Mitra (Nebularia) pyramis* (Wood).

Fig. 1. Probable holotype of *M. (N.) pyramis* (Wood); very worn specimen (BM (NH) 1967939; 46.7 x 14.5 mm).

Figs. 2, 3. Probable holotype of *M. loricata* Reeve (BM (NH) 1967939; 48.8 x 14.3 mm).

grooves number from 6-9 on the penultimate and from 17-20 on the body whorl, apart from about a dozen oblique spiral cords at the base. The axial riblets are not all of equal strength, some being lower and others more elevated, and protrude for a short distance over the sutures. Aperture almost equal in height to the spire, narrow and elongate, smooth within, outer lip weakly convex and constricted basally, moderately thickened and presumably bluntly crenulate by the spiral cords. Columella calloused, callus slightly more prominent anteriorly, and with 5-6 strong, oblique folds; siphonal fasciole moderately slender, slightly produced and only weakly recurved, siphonal notch distinct. White in colour, ornamented with dark orange blotches which are arranged transversely, and form 2 bands on the spire whorls and 3 on the body whorl; the blotches next to the sutures are larger than remaining blotches, aperture and columella cream to light yellow, columellar folds cream or white.

Measurements (mm)—

length	width	height of aperture	
48.8	14.3	24.2	Probable holotype of <i>loricata</i>
46.7	14.5	22.7	Probable holotype of <i>pyramis</i>
37.6	13.5	19.1	Likuri I., Fiji Ids.

Synonymy—

- 1821 *Mitra cancellata* Swainson, Zoological Illustrations, ser. 1, vol. 1, pl. 29, top and bottom figs. (no locality given); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 6, fig. 39; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 5, fig. 69 and pl. 11, fig. 172; 1882 Tryon, Manual Conchology, vol. 4, p. 119, pl. 35, fig. 55 (non *M. cancellata* Röding, 1798).
 1828 *Voluta pyramis* Wood, Index Testaceologicus, Suppl., p. 10, pl. 3, fig. 16b (no locality given).
 1844 *Mitra loricata* Reeve, Conchologia Iconica, vol. 2, pl. 22, fig. 174 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 8, pl. 10, figs. 147, 148; 1965 Cernohorsky, Veliger, vol. 8, p. 90, pl. 14, fig. 20.

Types—The probable holotype of *M. pyramis* (Wood), which also appears to be the type-specimen of *M. cancellata* Swainson (non Röding), is in the British Museum (NH) no. 1967939. In the same container, and under the same registration number, is a specimen which closely resembles the type-figure of *M. loricata* Reeve, and which could be the holotype ex-Metcalf's collection. The probable type-specimen of *M. pyramis* was accessioned in 1829, and the second, probable type of *M. loricata* must have been placed in the same box by error. No locality was given by either Swainson, Wood or Reeve, and we designate New Guinea as the type locality of *M. pyramis* (specimen in W.G. Buick coll.).

Records—MAURITIUS: (NMW; Maujean coll.). AUSTRALIA: Wheeler Reef, Townsville, Queensland (M. Marrow coll.). NEW GUINEA: Lea Lea (Buick coll.). FIJI ISLANDS: reef opposite the Fiji Museum, Suva, S. Viti Levu (Gell coll.); Likuri Island, W. Viti Levu (Jennings coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.).

Mitra aurantia subspecies

aurantia (Gmelin, 1791)

(Color pls. 256, 257; pl. 372, figs. 1-3)

Range—Gulf of Aden to Natal, S.E. Australia and Polynesia.

Remarks—The species is variable in form, sculpture and ornamentation. Several colour and sculptural forms occur throughout the species distributional range, and a weak subspecies lives along the Indian coast and the Gulf of Oman. These forms, originally described as species, are as follows:

***aurantia* form:** the typical form is spirally corded and the subsutural band is moderately broad.

***crassa* form:** the sculpture is more discreet, the shell is dark brown and broad, and the subsutural band is moderately narrow; this form is more frequently encountered in the western Pacific.

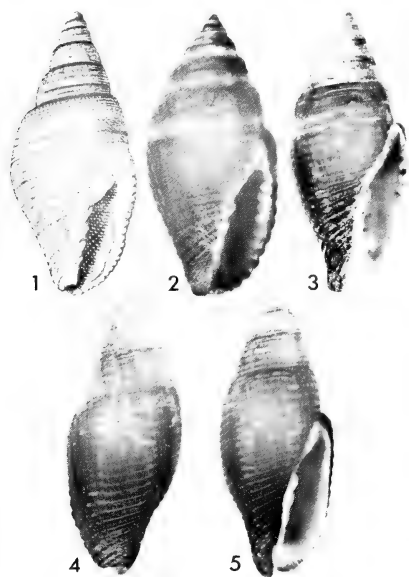


Plate 372. Figs. 1-3. *Mitra* (*Nebularia*) *aurantia aurantia* (Gmelin) Figs. 4, 5. *M. (N.) aurantia subruppeli* Finlay.

Fig. 1. Lectotype figure of *M. (N.) aurantia aurantia* (Gmelin) (from Chemnitz, 1780, vol. 4, pl. 150, fig. 1393).

Fig. 2. Lectotype of *M. nanus* Reeve (BM (NH) 1967819; 22.9 x 10.9 mm).

Fig. 3. Holotype of *M. carifa* Bartsch from South Africa (USNM 272154; 29.4 x 12.4 mm).

Figs. 4, 5. Holotype of *M. (N.) aurantia subruppeli* Finlay (BM (NH) 1919.12.31.43; 30.6 x 16.4 mm).

melinii form: the sculpture is rather fine and weak, and the subsubural band is very broad and extends to the body whorl suture; this is the *M. limbifera* of authors, and is generally found in the Indian Ocean.

nanus form: (Color pl. 257, fig. 2) generally smaller and more slender, the sculpture is of about the same strength as in the typical form, and the subsubural band is very narrow and has additional nebulous white spots within the pale zone; this form occurs in the Philippines, Indonesia and the Andaman Islands.

Several authors have reported *M. aurantia* from New Zealand, but the species does not live there.

Habitat—On reefs, in crevices, among algae and under coral rocks, from the intertidal zone to a depth of 2 fathoms.

Description—Shell up to 48 mm (about 2 inches) in length, elongate-ovate, heavy and solid, sutures deeply impressed and occasionally

ledged without being channeled. Whorls $6\frac{1}{2}$ -8, apart from $1\frac{1}{2}$ -2 white, smooth and conical nuclear whorls, spire whorls flat-sided, sculptured with deep or shallow spiral grooves and numerous, fine longitudinal hair-lines; in deeply grooved specimens the resulting cords are elevated and almost angulate, in shallowly grooved individuals the cords are weak and almost flat, with the exception of the basal cords. Spiral cords number from 3-8 on the penultimate and from 16-28 on the body whorl, inclusive of the basal cords. Aperture longer than the spire, moderately narrow and smooth within, outer lip thickened, convexly elongate and finely crenulate at the margin. Parietal wall glazed, anterior half of the columella distinctly calloused and with 4-6 moderately slender, oblique folds; siphonal fasciole straight and occasionally weakly calloused, siphonal notch distinct. Dark tan to dark brown in colour, ornamented with a single, white or yellowish-brown transverse band on the spire whorls and anterior to the body whorl suture; the band on the last whorl is either narrow or very broad and occasionally reaches the body whorl suture. Interior of aperture white, light violet or greyish-brown, columellar folds white or bluish-white. Young specimens have small white spots sparsely scattered over the body whorl. Periostracum thin, brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
43.0	18.4	24.6	Vuda Point, Fiji Ids.
36.2	14.3	20.0	Durban, Natal
29.4	12.4	17.5	Holotype of <i>carifa</i>
29.0	12.0	—	Type of <i>melinii</i>
28.2	13.2	17.1	Holotype of <i>aurantia</i>
28.8	12.4	17.0	Merca, Somalia, E. Africa
28.6	12.5	17.8	Almagro I., Philippines
			(<i>nanus</i> form)
22.9	10.9	14.3	Lectotype of <i>nanus</i>
20.4	9.5	12.4	Lectotype of <i>aurantiaca</i>
18.0	8.3	11.0	Rawai, Thailand

Synonymy—

- 1780 "*Turricula arausiaca fasciata alba*" Chemnitz, Syst. Conchylien-Cabinet, vol. 4, p. 231, pl. 150, figs. 1393, 1394 (non binomial).
 1791 *Voluta aurantia* Gmelin, Systema Naturae, ed. 13, p. 3454 (refers to Chemnitz, *op. cit.*, figs. 1393, 1394) [no locality given]; 1825 Wood, Index Testaceologicus, p. 98, pl. 20, fig. 120a.
 1798 *Mitra minuta* Röding, Museum Boltenianum, p. 137 (refers to Chemnitz, *op. cit.*, figs. 1393, 1394) [no locality given].
 1811 *Mitra aurantiaca* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 214 (no locality given); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 59, pl. 18, figs. 59, 59a; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 976, pl. 4, fig. 33 (figured lectotype).

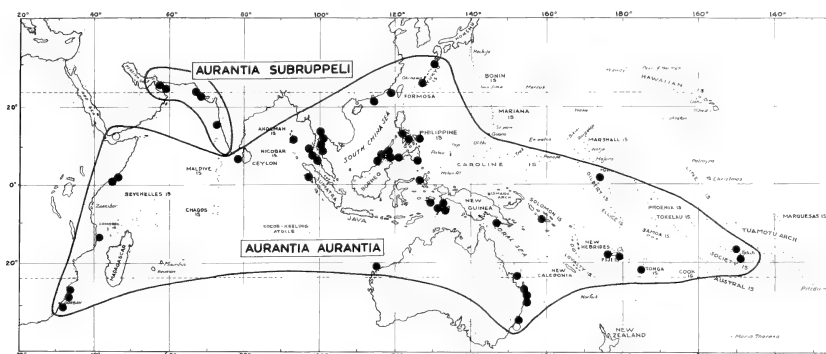


Plate 373. Geographical distribution of *Mitra* (*Nebularia*) *aurantia* (Gmelin) and its subspecies *M. (N.) aurantia subruppeli* Finlay.

- 1811 *Mitra peronii* Lamarck, *ibid.*, p. 220 (Southern or Indian Ocean); 1838 Kiener, *Spécies générale iconographie coquilles vivantes*, vol. 3, p. 58, pl. 18, fig. 58; 1969 Cernohorsky, *Revue Suisse Zoologie*, vol. 76, p. 986, pl. 6, fig. 49 (figured lectotype).
- 1811 *Mitra peronii* var. *limacina* Lamarck, *ibid.*, p. 220 (Southern or Indian Ocean); 1969 Cernohorsky, *Revue Suisse Zoologie*, vol. 76, p. 986.
- 1822 *Mitra crassa* Swainson, *Zoological Illustrations*, ser. 1, vol. 2, pl. 88, top and bottom figures (South Seas); 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 2, fig. 7; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 21, pl. 5, fig. 66.
- 1828 *Voluta crassa* Wood, *Index Testaceologicus*, Suppl., p. 10, pl. 3, fig. 18b.
- 1831 *Mitra michelinii* Guérin, *Mag. de Zoologie*, pt. 1, p. 38, pl. 38, 2 figs. (New Holland); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 20, pl. 15, fig. 259 (as *M. michelinii* on plate explanations).
- 1844 *Mitra aurantia* Reeve, *Conchologia Iconica*, vol. 2, pl. 23, figs. 182a, b; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 20, pl. 15, figs. 250, 251, 260; 1911 Martin & Icke in Selenka & Blanckenhorn, *Geol. Paläont. Ergeb. Trinl-Expedition*, p. 47.
- 1844 *Mitra limbifera* Lamarck, Reeve, *Conchologia Iconica*, vol. 2, pl. 23, figs. 180a, b; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 20, pl. 15, figs. 261, 262 (non Lamarck, 1811).
- 1844 *Mitra nanus* Reeve, *Conchologia Iconica*, vol. 2, pl. 24, sp. 194, fig. 193 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 21, pl. 21, fig. 434.
- 1845 *Mitra caeligena* Reeve, *Conchologia Iconica*, vol. 2, pl. 28, fig. 227 (no locality given) [young specimen].
- 1874 *Mitra consolidata* Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 19, pl. 15, fig. 271 (no locality given).
- 1882 *Mitra* (*Chrysame*) *aurantia* Gmelin, *Tryon, Manual Conchology*, vol. 4, p. 147, pl. 43, figs. 255, 256, 258 only; 1935 Dautzenberg, *Mém. Mus. Roy. d'Hist. Nat. Belg.*, vol. 2, p. 86 (with var. *michelinii* Guérin and *limbifera* Lamarck) [extended synonymy].
- 1915 *Mitra carifa* Bartsch, *Bull. U.S. Nat. Museum*, vol. 91, p. 44 (South Africa).
- 1920 *Strigatella limbifera* (Lam.), Cooke, *Proc. Zool. Soc. London*, p. 411 (description of radula).
- 1939 *Mitra* (*Mitraria*) *vermiculosa* Martyn, *Oostingh, Ingen. Nederl.-Indie*, vol. 6, p. 8, pl. 10, figs. 174a, b.

1962 *Chrysame crassa* Swainson, Iredale & McMichael, *Austral. Museum Mem.*, no. 11, p. 63.

1965 *Strigatella crassa* (Swainson), Cernohorsky, *Veliger*, vol. 8, p. 110, pl. 13, fig. 10, textfig. 7 (radula).

1966 *Chrysame ticaonica* (Reeve), Habe & Kosuge, *Shells world in colour*, vol. 2, p. 74, pl. 28, fig. 12 (forma *nanus* Reeve) [non *M. ticaonica* Reeve, 1844].

Types—The holotype of *M. aurantia* (Gmelin) and *M. minuta* Röding, is in the University Zoological Museum, Copenhagen. The lectotype of *M. aurantiaca* Lamarck, no. 1102/72 and the lectotype of *M. peronii* Lamarck, are in the Museum d'Histoire Naturelle, Geneva. The lectotype, here designated, and 2 syntypes of *M. nanus* Reeve, are in the British Museum (NH) no. 1967819, and the holotype of *M. carifa* Bartsch, is in the National Museum of Natural History, Washington, no. 272154. No locality was given by Gmelin for *M. aurantia*, and Reeve's first correct locality indication of Burias Island, Philippine Islands, is here selected as the type locality.

Nomenclature—Authors have adopted the taxon *M. limbifera* for the form of *M. aurantia* with the broad subsutural band and discreet sculpture. Lamarck's probable holotype of *M. limbifera*, however, is a very worn *Mitra* (*Strigatella*) *scutulata* (Gmelin).

Records—GULF OF ADEN: Aden (Shopland, 1902). EAST AFRICA: Mogadiscio, Somalia (USNM); Merca, Somalia (Cernohorsky coll.); Porto Amelia, Mozambique; Inhaca I.; Mozambique (both Orr coll.); SOUTH AFRICA: (USNM); Natal (AIM); Reunion Rocks, Natal (Powell coll.); Durban, Natal (Cernohorsky coll.). CEYLON: Colombo (USNM; Powell coll.). ANDAMAN ISLANDS: Port Blair (USNM; Steiner coll.). THAILAND: Bandon Bight; Sauracha, Gulf of Thailand; Lem Sing; Goh Sindakar Nua = Chance I.; Pulau Tanga, Butang group (all USNM); Ko Pai I., E. side Gulf of Thailand, 2 faths.; Ko Kram I., Sattahip, E. side Gulf of Thailand; Ko Chan I., Prachuap, W. side Gulf of Thailand; Rawai reef, Phuket (all Cernohorsky coll.). INDONESIA: Pulau Melila, off Sumatra;

Sapang Ayer, N. Borneo; Kudat Bay, N. Borneo; Marudu Bay, N. Borneo; Minutik I., Sabah, Jesselton, N. Borneo (all USNM); W. side Mitak I., Jambena Straits, Tanimbar; N. side Teluk Dodinga, near Ternate, Halmahera; E. side of Ree I., Tajandu I., Kai I., 1 fath.; Pomo I., Haruku Straits, E. of Ambon I.; Tg Sermaf, Kai I. (all WAM). PHILIPPINE ISLANDS: Davao Bay, Mindanao; Cataingan Bay, Dumurug Point, Masbate; vicinity of Balabac Island (all USNM); Almagro I., Samar (Cernohorsky coll.); Boac, Marinduque (Lumawig coll.); Santa Cruz, Zamboanga (Dan coll.). VIETNAM: Daming (Steiner coll.). CHINA: Whampoa (USNM); Hongkong (AIM). JAPAN: Osima, Osumi (USNM). RYUKYU ISLANDS: Okinawa (USNM). NEW GUINEA: Taurama Beach, Port Moresby (McCollin coll.; Kleckham coll.); Ela Beach, Port Moresby (Kleckham coll.). AUSTRALIA: WEST AUSTRALIA: Shark Point, 20°53'S & 115°22'E (WAM). QUEENSLAND: Northwest Island, Capricorn group (WAM). Myron reef, Stradbroke I. (AMNH); Bardo Goat I., Moreton Bay; off Peel I., Moreton Bay; Point Cartwright (all Powell coll.). CALOUNDR (AIM; Powell coll.). NEW SOUTH WALES: (Iredale & McMichael, 1962); Iluka (Kleckham coll.). SOLOMON ISLANDS: Pavuvu I., Russel Strait (USNM). FIJI ISLANDS: Vuda Point, W. Viti Levu; Nasese reef, Suva, S. Viti Levu (both Cernohorsky coll.). GILBERT ISLANDS: Bikenibeu, Tarawa I. (Foreman coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.). SOCIETY ISLANDS: Patutoa, Tahiti; Motu Iriru, Raiatea (both USNM).

Fossil records—PLIOCENE: Boland-Malingping, Tjikeusik district, Bantam, Java, Indonesia (Oostingh, 1939); Java, Indonesia (Martin & Icke, 1911).

***Mitra aurantia* subspecies
subruppeli Finlay, 1927**

(Color pl. 257, fig. 3; pl. 372, figs. 4, 5)

Range—Gulf of Oman to Goa, W. coast of India.

Remarks—The subspecies differs from *M. aurantia* s. str. primarily in colour, and partly in sculpture. The shell is uniformly fawn to light tan and lacks the pale transverse band on the whorls; in some small, but mature individuals, there are a few nebulous white spots on the body whorl. In some specimens from India, the pale subsutural band is only faintly visible. The aperture is off-white, the columella is white and sometimes flushed with brown; the spiral cords are narrower than in the subspecies *aurantia*, and number from 5-6 on the penultimate and up to 25 on the body whorl. The aperture is about equal in height or longer than the spire.

This may be the same subspecies which has been reported from India and the Persian Gulf by several authors under the name *M. caeligena* Reeve.

Measurements (mm)—

length	width	height of aperture	
36.2	14.2	17.6	Ras Jagin, Gulf of Oman
30.6	11.7	16.4	Holotype of <i>subruppeli</i>
26.6	12.0	15.8	Karachi, Pakistan

Synonymy—

1914 *Mitra multisulcata* Sowerby, Ann. & Mag. Nat. History, vol. 14, p. 476, pl. 19, fig. 3 (New Caledonia = error!) [non *M. multisulcata* Harris, 1897].

1927 *Mitra subruppeli* Finlay, Trans. Proc. New Zealand Inst., vol. 57, p. 508 (substitute name for *M. multisulcata* Sowerby, 1914).

Types—The holotype of *M. subruppeli* Finlay, is in the British Museum (NH) no. 1919.12.31.43. Sowerby's locality indication of New Caledonia is erroneous, since this subspecies does not occur in the Pacific Ocean. We designate Karachi, Pakistan as the type locality of *M. aurantia subruppeli* (specimens in USNM).

Records—GULF OF OMAN: Muscat (AMNH); Ras Jagin (Cernohorsky coll.). PAKISTAN: Karachi (USNM; Steiner coll.); Hawk's Bay, 15 mi. from Karachi (Cernohorsky coll.). INDIA: Goa (USNM).

***Mitra aurantia* forma
crassicosata Sowerby, 1874**
(Pl. 374)

Range—Philippine Islands to the Marshall Islands.

Remarks—*M. crassicosata* closely resembles the prominently sculptured form of *M. aurantia* (Gmelin), and is only tentatively considered as a good species; only 3 Recent and 1 fossil specimens were examined in museums and private collections. The species appears to differ in the longer body whorl, short spire and angulate whorls; the penultimate whorl has 3-4 prominent and elevated spiral cords and the body whorl

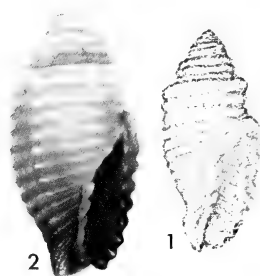


Plate 374. *Mitra (Nebularia) crassicosata* Sowerby.

Fig. 1. Lectotype figure (from Sowerby, 1874, pl. 19, fig. 387).

Fig. 2. Specimen from the Philippine Islands (NMW; 24.0 x 11.3 mm).

16-18; the interspaces of the cords are axially striate. The outer lip is thickened and crenulate, the parietal wall is only glazed and the anterior of the columella has 4 folds. Fresh specimens are uniformly dark orange-brown in colour and lack the pale subsutural band of *M. aurantia*; the interior of the aperture is orange-brown and the columellar folds are white.

Habitat—Unknown; probably on reefs, in crevices and under coral.

Measurements (mm)—

length	width	height of aperture	
24.0	11.3	15.2	Philippines
22.0	10.0	13.0	Lectotype figure of <i>crassicostata</i>

Synonymy—

1874 *Mitra crassicostata* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 21, pl. 19, fig. 387 (no locality given).

1882 *Mitra (Chrysame) vexillum (pars)* Reeve, Tryon, Manual Conchology, vol. 4, p. 146, pl. 43, fig. 254 only (non Reeve, 1844).

1966 *Chrysame crossocostatus (sic)* (Sowerby), Habe & Kosuge, Shells world in colour, vol. 2, p. 119, pl. 45, fig. 3.

Types—The type-specimen of *M. crassicostata* is untraceable and has been probably sold at auction of the Taylor collection. We therefore designate the specimen figured by Sowerby on plate 19, figure 387, as the lectotype of *M. crassicostata*. No locality was given by Sowerby, and Boac Island, Marinduque, Philippine Islands, is designated as the type locality.

Records—PHILIPPINE ISLANDS: (NMW): Boac, Marinduque (Deynzer coll.). MARSHALL ISLANDS: Majuro Island (BPBM).

Fossil records—PLIOCENE-PLEISTOCENE: Guam Island, Sinajama, Mariana limestone, Marianas (USGS no. 20732).

***Mitra ticaonica* Reeve, 1844**

(Color pl. 257, figs. 4, 5; pl. 375)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—This uncommon species exhibits characters intermediate between species of the subgenus *Nebularia* and *Strigatella*, but since it resembles, and has been occasionally confused with *M. aurantia* (Gmelin), it is retained in the subgenus *Nebularia*.

Habitat—On reefs, under rocks and coral and on a rubble substratum, from the intertidal zone to a depth of 12 fathoms.

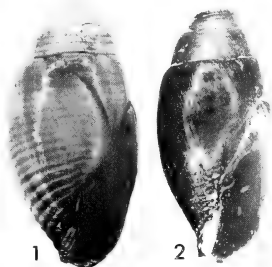


Plate 375. *Mitra (Nebularia) ticaonica* Reeve.

Fig. 1. Lectotype from Ticao Id., Philippine Ids. (BM (NH) 1967895; 31.6 x 14.6 mm).

Fig. 2. Holotype of *M. ticaonica vagans* Pilsbry from Hilo, Hawaiian Ids.; slender form (ANSP 46790; 25.0 x 10.7 mm).

Description—Shell up to 35 mm (about 1½ inches) in length, solid, elongate-ovate to cylindrically-elongate, body whorl occasionally broad, sutures irregular and narrowly channeled. Whorls 6-7, apart from 1½-2 white, smooth nuclear whorls, spire whorls convex, sculptured with moderately shallow, narrow and macroscopically striate spiral grooves which number from 1-6 on the penultimate and from 4-10 on the body whorl, apart from 10-15 oblique cords on the lower half of the body whorl; the spiral grooves are sometimes very shallow and absent on the centre of the body whorl and at other times moderately deep, and produce feebly elevated, flat or weakly rounded cords. Aperture longer than the spire, narrow and smooth within, outer lip thickened and crenulate at the margin, occasionally thickened within at its posterior third. Columella calloused anteriorly, and with 3-5 oblique folds, parietal wall glazed, siphonal fasciole short, straight and occasionally weakly calloused, siphonal notch distinct. Brown to tan in colour, occasionally ornamented with darker brown axial streaks and a few, very small white spots; some individuals are uniformly dark brown, and in the lighter coloured specimens the siphonal fasciole is flushed with purple-brown. Aperture and columella brown to purple-brown, columellar folds white. Periostracum thin, brown and translucent.

Measurements (mm)—

length	width	height of aperture	
31.6	14.6	19.1	Lectotype of <i>ticaonica</i>
31.0	14.5	18.0	Viti Levu Bay, Fiji I.
29.5	10.7	16.2	Honolulu, Hawaiian I.

stricted near the base, sutures irregular, obsoletely and bluntly crenulate and narrowly channelled. Whorls 6-7, apart from protoconch, spire whorls subangulate, body whorl rather long; first 2-3 post-nuclear whorls sculptured with 3 spiral cords, cords becoming flat and only weakly elevated on the last 2 whorls. The spiral grooves are very shallow and irregular and obsoletely axially striate; The spiral cords number from 3-4 on the penultimate and from 15-18 on the body whorl. The aperture is longer than the spire, narrow and smooth within, outer lip thickened, weakly convex and prominently crenulate at the margin. Columella calloused, callus more prominent anteriorly, and with 4-6 oblique folds which have a tendency to intercalate; siphonal fasciole short, straight or slightly recurved and sometimes calloused, siphonal notch distinct. Reddish-orange to orange-brown in colour, lined with dark brown in the spiral grooves, siphonal fasciole usually flushed with dark brown; aperture and columella orange-brown to reddish-brown. Periostracum light brown, thin and longitudinally striate.

Measurements (mm)—

length	width	height of aperture	
29.6	12.5	16.4	Lectotype of <i>vexillum</i>
27.5	12.2	17.0	Boac I., Philippines
22.8	9.7	12.6	off Cabaaban coast, Philippines
21.6	10.9	12.8	Russell I., Solomon Ids.

Synonymy—

- 1844 *Mitra vexillum* Reeve, *Conchologia Iconica*, vol. 23, pl. 23, figs. 183a, b (Philippine Islands); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 21, pl. 15, fig. 270.
 1882 *Mitra (Chrysame) vexillum* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 146, pl. 43, fig. 253 only; 1923 Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 139.
 1964 *Chrysame vexillum* (Swainson), Habe, *Shells west Pacific colour*, vol. 2, p. 108, pl. 34, fig. 24; 1966 Habe & Kosuge, *Shells world in colour*, vol. 2, p. 75, pl. 28, fig. 28.

Types—The 3 syntypes of *M. vexillum* Reeve, are in the British Museum (NH) no. 1967910; the smallest, 29.6 mm long specimen is here selected as the lectotype. The type locality is Philippine Islands.

Nomenclature—Sowerby (1874), Habe (1964) and Habe & Kosuge (1966), credit Swainson with the authorship of *M. vexillum*, but Swainson did not describe the species.

Records—PHILIPPINE ISLANDS: Zamboanga, Mindanao; Davao, Mindanao; Cebu (all USNM and MCZ); off Zamboanga (AMNH); off coast of Cabaaban, Bataan (Cernohorsky coll.); Boac, Marinduque (Lumawig coll.; Cernohorsky coll.); Subic Bay, Luzon (DMNH). RYUKYU ISLANDS: Amami Islands (Habe, 1964). SOLOMON ISLANDS: Gizo (Steiner coll.); Siota, Florida group; Russell Island (both AIM); Marau Sound, Guadalcanal (Gower coll.; Cernohorsky coll.).



Plate 377. *Mitra (Nebularia) vexillum* Reeve. Lectotype from the Philippine Ids. (BM (NH) 1967910; 29.6 x 12.5 mm).

Mitra fulvescens Broderip, 1836

(Color pl. 257, figs. 8-11; pl. 378)

Range—Mauritius to the Tuamotus and the Hawaiian Islands.

Remarks—The species has been reported from Aden by Shopland (1902), but we have not seen specimens from west of Mauritius. The species is as variable in form as other Mitridae, and the body whorl may be moderately broad or slender and constricted. The slender form of *M. fulvescens* has

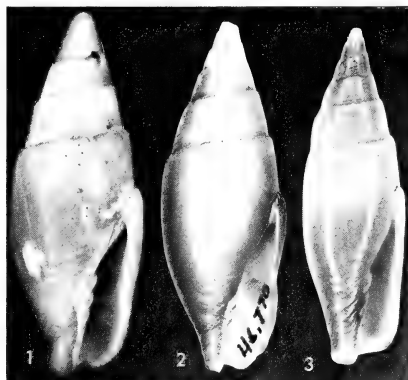


Plate 378. *Mitra (Nebularia) fulvescens* Broderip.

Fig. 1. Lectotype from Anaa Id., Tuamotu Archipelago (BM (NH) 1967765; 30.6 x 11.2 mm).

Fig. 2. Holotype of *M. ostergaardi* Pilsbry from Honolulu Harbor, Hawaiian Ids. (ANSP 46770; 43.1 x 15.5 mm).

Fig. 3. Holotype of *M. telum* Sowerby from Barkley Id., Mauritius; slender form (NMW; 25.1 x 7.8 mm).

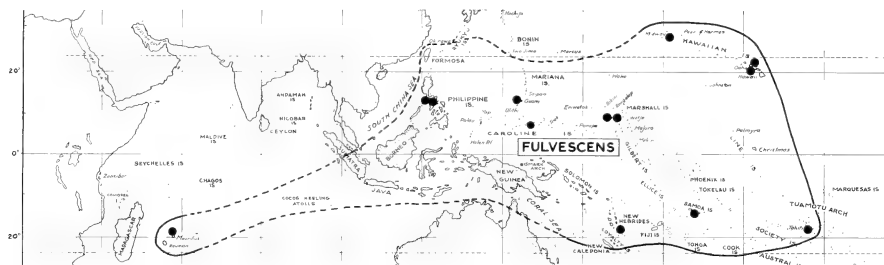


Plate 379. Geographical distribution of *Mitra (Nebularia) fulvescens* Broderip.

been described as *M. telum* Sowerby, and we have examined specimens of this form from Mauritius, the New Hebrides, Marianas and the Hawaiian Islands.

Habitat—Under rocks and coral, in crevices and on a coral-rubble substratum, from 2 to 25 fathoms.

Description—Shell up to 45.0 mm (about 1¾ inches) in length, elongate-ovate, solid, body whorl inflated or slender, sutures narrowly channeled and minutely crenulate. Whorls 6-7, apart from an eroded protoconch, spire-whorls flat-sided and weakly subangulate at the sutures, body whorl convex, sculptured with spiral rows of small and slightly distant pittings, which number from 5-7 on the penultimate and from 6-12 on the body whorl, apart from 6-12 oblique cords towards the base; the pitted spirals are either prominent or obsolete on the last whorl, and in a few specimens examined there was no trace of a spiral sculpture. Aperture equal in height or slightly longer than the spire, narrow and smooth within, outer lip thickened, descending almost vertically, slightly constricted at the upper fourth and finely crenulate at the margin; columella prominently calloused, callus thin on the parietal wall but occasionally laminated anteriorly, and with 4-6 oblique and regular columellar folds. Siphonal fasciole short, straight or recurved to the left, siphonal notch distinct. Tan to dark brown in colour, occasionally with a pale transverse zone anteriorly to the body whorl suture, and with a few small, white spots sprinkled at random over the surface of the last whorl; the pale zone and small spots may be faint or even absent in some individuals. Aperture and columella bluish-white, edge of parietal wall usually brown. Periostracum thin, dark brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
43.1	15.5	22.4	Holotype of <i>ostergaardi</i>
41.7	14.3	22.7	Marinduque I., Philippines
32.6	12.4	17.6	Kailua Bay, Hawaiian Ids.
30.6	11.2	15.1	Lectotype of <i>fulvescens</i>
25.1	7.8	12.6	Holotype of <i>telum</i>
23.7	7.3	13.2	Guam I., Marianas
21.0	7.2	11.7	Teuma Bay, New Hebrides

Synonymy—

- 1836 *Mitra fulvescens* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Anaa I., Tuamotus); 1845 Reeve, Conchologia Iconica, vol. 2, pl. 31, fig. 255; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 21, fig. 452; 1969 Cernohorsky, Hawaiian Shell News, vol. 17, no. 12, p. 1, fig. 1 (figured lectotype).
 1874 *Mitra telum* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 27, figs. 613, 614 (Barkley I., Mauritius).
 1882 *Mitra (Chrysamne) fulvescens* Swainson, Tryon, Manual of Conchology, vol. 4, p. 148, pl. 44, fig. 271.
 1882 *Mitroidea telum* Sowerby, Tryon, *ibid.*, p. 163, pl. 47, fig. 376.
 1921 *Mitra ostergaardi* Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 72, p. 314, pl. 12, fig. 22 (Honolulu Harbour, Hawaiian I.); 1962 J. Cate, Veliger, vol. 4, p. 143, pl. 33, fig. 3 (figured holotype); 1963, Veliger, vol. 6, p. 39, pl. 8, figs. 43, 44 (figured holotype); 1966 Cernohorsky, Veliger, vol. 9, p. 107, textfig. 11 (radula).
 1953 *Strigatella golishi* "Dall MS", Dietrich & Morris, Nautilus, vol. 67, no. 1, p. 18, pl. 4, fig. 9 (*nomen nudum*).
 1963 *Mitra ancillides* Broderip, J. Cate, Veliger, vol. 6, p. 37 (non Broderip, 1836).
 1963 *Mitra golishi* "Dall MS", J. Cate, *ibid.*, p. 37, pl. 7, fig. 37 (*nomen nudum*).
 1963 *Mitra pararrhodia* "Dall MS", J. Cate, *ibid.*, p. 39, pl. 8, fig. 42 (*nomen nudum*).

Types—Two beach-worn syntypes of *M. fulvescens* Broderip, are in the British Museum (NH) no. 1967765; the smaller, 30.6 mm long specimen, is here selected as the lectotype. The holotype of *M. telum* Sowerby, is in the National Museum of Wales, Cardiff, and the holotype of *M. ostergaardi* Pilsbry, is in the Academy of Natural Sciences, Philadelphia, no. 46770. The type locality is Anaa Island, Tuamotu Islands.

Records—MAURITIUS: Barkley Island (NMW). PHILIPPINE ISLANDS: Marinduque Island (Lumawig coll.); between pier and Caltex refinery, Batangas Bay, 2 faths. (Cernohorsky coll.). MARIANAS: Apra harbour, Guam I. (USNM). MARSHALL ISLANDS: Kwajalein Atoll; Ugaie Atoll (both USNM). CAROLINE IDS.: Losap Id., Mortlocks (DMNH). NEW HEBRIDES: Pango Point, Efate I. (Allan coll.; Cernohorsky coll.); Teuma Bay, S. Efate I. (Dale coll.). SAMOA ISLANDS: Apia harbour (Jackson coll.). TUAMOTU ISLANDS: Anaa Island (BMNH). HAWAIIAN ISLANDS: off Nanakuli, Oahu (Deynzer coll.); Kailua Bay, Oahu, 10 faths. (Weaver coll.; Cernohorsky coll.); Moanalua Bay, Oahu (Clover coll.); off Waikiki, Oahu, 25-50 faths. (USNM); Honolulu Harbour, Oahu (ANSP). MIDWAY ISLANDS: Sand Island (USNM).

***Mitra telescopium* Reeve, 1844**

(Color pl. 257, fig. 12; pl. 380)

Range—East Africa to the Fiji Islands and Australia.

Remarks—This rare species is closely related to *M. fulvescens* (Broderip), and differs in the more telescopic whorls, deeper sutures and in having the lower two-thirds of the last whorl dark-brown. It is one of the very few mitrids which have no synonyms.

Habitat—On reefs, under rocks and coral and in crevices, in the intertidal zone.

Description—Shell up to 26 mm (1 inch) in length, elongate-ovate to cylindrical-elongate, only moderately solid, sutures irregular, channelled and obsoletely serrated. Whorls 6-8, apart from an eroded protoconch, spire whorls flat-sided or weakly convex, occasionally subangulate at the sutures, sculptured with spiral rows of small pittings which number from 3-6 on the penultimate and from 7-15 on the body whorl, apart from 9-12 oblique basal cords. Aperture longer than the spire, moderately narrow and smooth within, outer lip descending almost vertically, weakly thickened and crenulate at the margin, slightly constricted at its posterior third. Columella with a callous glaze anteriorly and with 4-5 oblique folds, siphonal canal slightly produced, siphonal notch distinct. Cream, flesh to fawn in colour, lower part of body whorl, commencing at the apertural periphery, dark brown; the brown zone and sutures are bordered by a distinct or faint, yellowish spiral band. Columella and aperture dark brown, columellar glaze and folds bluish-white to light violet, apex dark brown. Periostracum very thin, orange-brown and translucent.

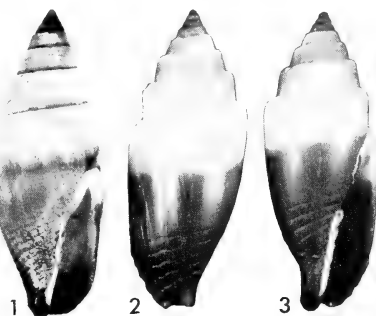


Plate 380. *Mitra (Nebularia) telescopium* Reeve.

Fig. 1. Lectotype from Ticao Id., Philippine Ids. (BM (NH) 1967891; 24.7 x 9.3 mm).

Figs. 2, 3. Specimen from Suva reef, S. Viti Levu, Fiji Ids. (WOC coll.; 20.0 x 8.2 mm).

Measurements (mm)—

length	width	height of aperture	
25.2	10.0	14.8	Syntype of <i>telescopium</i>
24.7	9.3	13.3	Lectotype of <i>telescopium</i>
19.5	7.8	12.2	Bay of Islands, Fiji Ids.
18.5	7.6	10.8	Taurama beach, New Guinea
15.0	6.5	8.6	Siasi, Philippines

Synonymy—

1844 *Mitra telescopium* Reeve, *Conchologia Iconica*, vol. 2, pl. 20, fig. 80 (Island of Ticao, Philippines); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 11, pl. 16, fig. 304; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 30.

1882 *Mitra (Cancilla) telescopium* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 143, pl. 42, fig. 225.

1923 *Mitra (Chrysame) telescopium* Reeve, Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 132.

1965 *Strigatella telescopium* (Reeve), Cernohorsky, Veliger, vol. 8, p. 114, pl. 17, fig. 57; 1966 Habe & Kosuge, *Shells world in colour*, vol. 2, p. 75, pl. 28, fig. 23.

Types—Three syntypes of *M. telescopium* Reeve, are in the British Museum (NH) no. 1967891; the 24.7 mm long specimen is here selected as the lectotype. The type locality is Ticao Island, Philippine Islands.

Records—EAST AFRICA: Mogadiscio, Somalia (USNM). MAURITIUS: (Dautzenberg & Bouge, 1923). INDONESIA: W. side of Mitaki I., Jamdena Straits, Tanimbar (WAM); Boeroe I., Banda Sea (Cernohorsky coll.). PHILIPPINE ISLANDS: Samar Island (Steiner coll.); Marinduque Island (Clover coll.); Ticao Island (BMNH); Siasi, Sulu (Cernohorsky coll.); Subic Bay, Luzon and Davao, Mindanao (both DMNH). CHINA: Whampoa (USNM). NEW GUINEA: Taurama beach, Port Moresby (Buick coll.; Cernohorsky coll.). NEW HEBRIDES: Efate Island (Dale coll.). LOYALTY ISLANDS: Lifu (USNM; AIM). FIJI ISLANDS: Lami, Suva, S. Viti Levu (Gardner coll.); Bay of Islands, Suva harbour, S. Viti Levu (Cernohorsky coll.). AUSTRALIA: Sand Cay No. 8, Queensland (J. E. du Pont, DMNH); Wreck Bay, Queensland (DMNH).

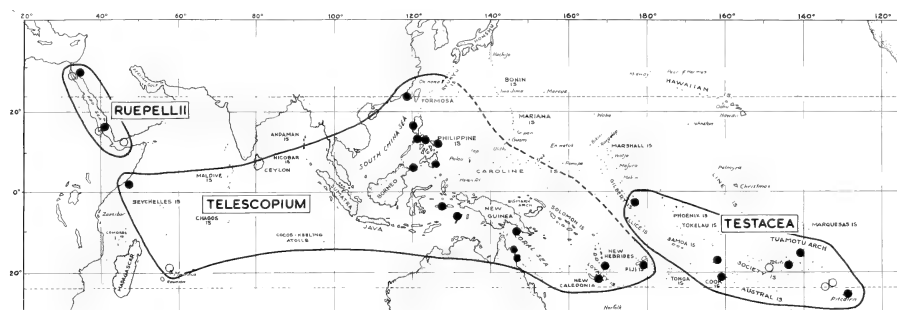


Plate 381. Geographical distribution of the species *Mitra* (*Nebularia*) *telescopium* Reeve, *M. (N.) testacea* Broderip, and *M. (N.) ruepellii* Reeve.

***Mitra testacea* Broderip, 1836**

(Pl. 382)

Range—Kingsmill Islands to Polynesia.

Remarks—This rare species which is seldom collected alive, appears to be confined to the central South Pacific and Polynesia. It has been reported from Japan by Kuroda & Habe (1952), but a misidentification is suspected. *M. antoni* Dohrn, which is a small, broad and not fully mature specimen of *M. testacea*, has been described from the Hawaiian Islands, but the species' occurrence there remains unconfirmed, although possible. The species is easily recognized by its uniformly tan colour, often telescopic whorls, spiral cords which tend to be obsolete on the dorsal side of the body whorl, constricted base and aperture and recurved canal.

Habitat—Unknown.

Description—Shell up to 32 mm (about 1¼ inches) in length, elongate-ovate to cylindrically-elongate, sutures prominent and narrowly ledged, smooth, body whorl distinctly constricted at the base. Whorls 6-7, apart from an eroded protoconch, spire whorls flat-sided to weakly convex, sculptured with shallow or moderately deep, sharply incised spiral grooves which are narrow and punctate or striate; in deeply grooved specimens the spiral cords are more elevated, flat or slightly rounded, and number from 5-8 on the penultimate and from 17-25 on the body whorl. The spiral grooves have a tendency to become obsolete in the centre of the body whorl in some individuals,

but may be continuous from suture to base in others; fine longitudinal hair-lines descend into the grooves and cords. Aperture equal in height or shorter than the spire, narrow and smooth within, outer lip moderately thickened and smooth, constricted near the commencement

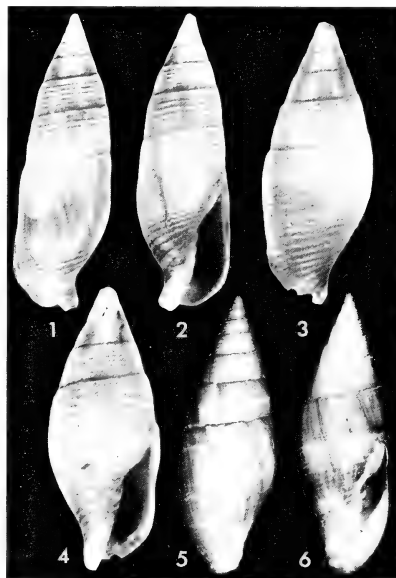


Plate 382. *Mitra* (*Nebularia*) *testacea* Broderip.

Figs. 1, 2. Lectotype from Anaa Id., Tuamotu Archipelago; slender form (BM (NH) 1967892; 28.6 x 9.0 mm).

Figs. 3, 4. Holotype of *M. antoni* Dohrn from the "Hawaiian Islands"; short, broad form (BM (NH) 1964415; 19.8 x 7.7 mm).

Figs. 5, 6. Holotype of *M. obliqua* Lesson from the Gambier Ids.; juvenile specimen (MHNP; 30.0 mm) [photo courtesy of B. Salvat, MHNP].

but slightly flaring basally. Columella not calloused but parietal wall occasionally thickened, columella with 5 or 6 oblique folds; siphonal fasciole prominently corded, slightly drawn out and recurved to the left, siphonal notch distinct. Uniformly light to dark tan in colour, protoconch and siphonal fasciole occasionally paler, aperture and columella light tan. Juvenile shells have occasionally pale bands at the sutures.

Measurements (mm)—

length	width	height of aperture	
31.8	10.8	14.5	Syntype of <i>testacea</i>
30.0	—	—	Holotype of <i>obliqua</i>
28.6	9.0	13.3	Lectotype of <i>testacea</i>
26.5	9.4	12.2	Garumaoa I., Tuamotu Ids.
23.5	8.0	10.6	Garumaoa I., Tuamotu Ids.
19.8	7.7	10.4	Holotype of <i>antoni</i>
16.0	6.0	7.5	Rarotonga, Cook Ids.

Synonymy—

1836 *Mitra testacea* Broderip, Proc. Zool. Soc. London, pt. 3, p. 193 (Anaa I., Tuamotu I.); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 14, fig. 98; 1861 Dohrn, Malakozool. Blätter, vol. 8, p. 134 (placed *M. antoni* in synonymy); 1873 Garrett, Proc. Zool. Soc. London, for 1872, p. 839; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 7, pl. 8, fig. 103; 1880 Garrett, Journal of Conchology, vol. 3, p. 29; 1882 Tryon (pars), Manual Conchology, vol. 4, p. 127, pl. 37, fig. 110 only; 1907 Couturier, Journal de Conchyliologie, vol. 55, p. 132; 1933 Dautzenberg & Bouge, Journal de Conchyliologie, vol. 77, p. 193.

1842 *Mitra obliqua* Lesson, Revue Zool. Soc. Cuv. Mag., vol. 5, p. 142 (Gambier Islands) [juvenile specimen].

1860 *Mitra antoni* Dohrn, Proc. Zool. Soc. London, p. 368 (Sandwich Islands = Hawaiian Islands) [non Küster, 1839].

Types—The 3 syntypes of *M. testacea* Broderip, are in the British Museum (NH) no. 1967892, and the 28.6 mm long specimen, which corresponds to Broderip's cited dimensions, is here selected as the lectotype. The holotype of *M. antoni* Dohrn (non Küster), is in the British Museum (NH) no. 1964415, and the holotype of *M. obliqua* Lesson, is in the Museum National d'Histoire Naturelle, Paris. The type locality is Anaa Island, Tuamotu Islands.

Records—KINGSMILL ISLANDS: (Garrett, 1873). COOK ISLANDS: Palmerston Atoll (Steiner coll.); Rarotonga (Cernohorsky coll.). SOCIETY ISLANDS: Tahiti (Garrett, 1880). TUAMOTU ISLANDS: Anaa Island (BMNH); Garumaoa, Raroia Atoll (USNM). GAMBIE ISLANDS: (Lesson, 1842); Aukena (Couturier, 1907). PITCAIRN ISLANDS: (USNM).

Mitra ruepellii Reeve, 1844

(Color pl. 257, fig. 13; pl. 383)

Range—Red Sea to the Gulf of Aden.

Remarks—The species is closely related to *M. aurantia* (Gmelin), and bears a close resemblance to the corded form from Thailand and the Philippine Islands, and also resembles *M. crassicostata* in sculpture. The pale subsutural band is absent in *M. ruepellii*, the shell is more slender and the spiral cords are more regular.

Habitat—Under stones, in the intertidal zone.

Description—Shell up to 30 mm (about 1½ inches) in length, fusiformly-elongate to elongate-ovate, solid, sutures distinct and occasionally very narrowly channeled. Whorls 6-7, apart from an eroded protoconch, spire whorls flat-sided and occasionally subangulate at sutures, sculptured with prominent, elevated, rounded or flat-topped spiral cords which number from 4-6 on the penultimate and from 15-20 on the body whorl; the interspaces of the cords are either narrow or as broad as the cords, only moderately deep, and sculptured with fine, macroscopic longitudinal hair-lines which are occasionally more prominent towards the base of the body whorl. Aperture shorter or longer than the spire, narrow and smooth within; the outer lip descends almost vertically and is slightly angulate at the anterior third, thickened and crenulate at the margin. Columella calloused, callus generally more prominent and flanged anteriorly, and with 4-5 oblique folds; siphonal fasciole straight, weakly calloused, siphonal notch distinct but shallow.

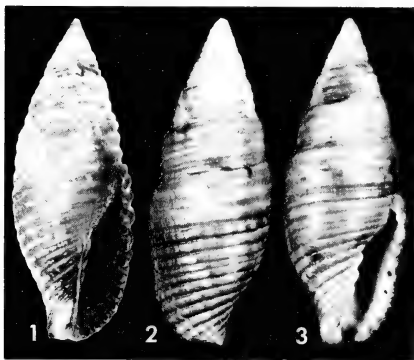


Plate 383. *Mitra (Nebularia) ruepellii* Reeve.

Fig. 1. Lectotype from the Red Sea (BM (NH) 1967871; 26.5 x 10.1 mm).

Figs. 2, 3. Specimen from Eilat, Gulf of Aqaba, Red Sea (Dafni coll.; 29.6 x 11.2 mm).

Uniformly light tan to dark brown in colour, aperture and columella bluish-white or light violet, crenulations on outer lip and margin of columellar callus frequently brown; in some individuals a very faint, pale subsutural band is discernible on the body whorl.

Measurements (mm)—

length	width	height of aperture	
28.8	10.3	13.8	Eilat, Gulf of Aqaba
26.5	10.1	14.8	Lectotype of <i>rupeellii</i>
26.4	9.4	12.8	Syntype of <i>rupeellii</i>
26.3	10.2	13.5	Eilat, Gulf of Aqaba

Synonymy—

- 1844 *Mitra ruppellii* Reeve, *Conchologia Iconica*, vol. 2, pl. 23, fig. 179 (Red Sea); 1902 Shopland, *Proc. Malac. Soc. London*, vol. 5, p. 173.
 1844 *Mitra planilirata* Reeve, *Conchologia Iconica*, vol. 2, pl. 23, fig. 184 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 20, pl. 28, fig. 663.
 1874 *Mitra ruppellii* Reeve, Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 21, pl. 23, fig. 509 (partly emended spelling).
 1882 *Mitra (Chrysame) solanderi (pars)* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 146, pl. 43, fig. 251 only (non *M. solanderi* Reeve, 1844).
 1920 *Strigatella planilirata* Reeve, Cooke, *Proc. Zool. Soc. London*, p. 411 (description of radula).

Types—The lectotype, here designated, and 2 syntypes of *M. ruppellii* Reeve, are in the British Museum (NH) no. 1967871; the type-specimen of *M. planilirata* Reeve, was sold at auction of the Norris collection. The type locality is Red Sea.

Nomenclature—Reeve named the species for Prof. W.P.E.S. Rüppell, but misspelled the specific name "*ruppellii*." The incorrect spelling has been partly emended to "*rupeellii*" by Sowerby, and is here further emended to "*rupeellii*." *M. planilirata* Reeve, is only a form of *M. ruppellii* with flat-topped spiral cords.



Plate 384. *Mitra (Nebularia) lugubris* Swainson. Lectotype figure (from Swainson, 1821, pl. 66, top and bottom figs.).

Records—RED SEA: Eilat, Gulf of Aqaba (Hadar coll.; Deynzer coll.; Peled coll.; Cernohorsky coll.); Gulf of Suez; Massawa (Jickeli, 1874); Dahlak Islands, 15°28'N & 40°40'E, 3-5 faths. (TAU; MCZ). GULF OF ADEN: Aden (Shopland, 1902).

***Mitra lugubris* Swainson, 1821**

(Color pl. 257, figs. 14, 15; pl. 384)

Range—Philippine Islands to S.E. Australia, Polynesia and the Hawaiian Islands.

Remarks—This uncommon species is easily recognized by its rough sculpture, dark greenish-brown colour with a snow-white tail and a broad, axially folded white sutural band. In addition to our records, Garrett (1880) reported the species from the Caroline Islands, Samoa, Kingsmill and the Tuamotu Islands.

Habitat—On reefs, in crevices and under coral, generally within the intertidal zone, but occasionally dredged at depth ranging from 4-25 fathoms.

Description—Shell up to 33 mm (about 1¼ inches) in length, elongate-ovate and solid, sutures deeply impressed and irregularly crenate. Whorls 5-7, apart from protoconch of 2-2½ white, smooth nuclear whorls, spire whorls weakly convex, sculptured with bisecting spiral and longitudinal threads of about equal strength, longitudinal striae occasionally weaker on the body whorl. The spiral threads number from 3-7 on the penultimate and from 12-17 on the body whorl, longitudinal threads from 20-37 on the penultimate and from 28-40 on the body whorl; the interspaces of the cords are pitted at the point of

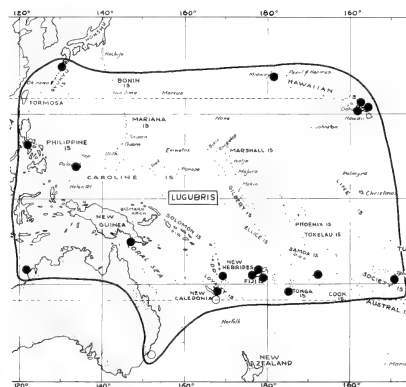


Plate 385. Geographical distribution of *Mitra (Nebularia) lugubris* Swainson.

intersection of the cords. At the sutures the longitudinal threads are more prominent and in the form of weak axial folds which protrude over the suture and give the shell a crenate appearance. Aperture longer than the spire, moderately narrow and smooth within; outer lip descending almost vertically, thickened and finely crenulate at the margin. Columella glazed on the parietal wall but distinctly calloused anteriorly, and with 5-6 prominent oblique folds; siphonal fasciole sometimes calloused, straight or slightly recurved, siphonal notch prominent. Dark brown or greenish-brown in colour, whorls with a moderately broad, white band at the sutures and a few small white spots on some of the cords, tip of siphonal fasciole white; aperture white, bluish-white or light brown, parietal wall brown, columellar folds and callus white or bluish-white. Periostracum thin, brown and opaque.

Measurements (mm)—

length	width	height of aperture	
27.0	11.6	15.4	Manava I., Fiji Ids.
25.0	10.3	14.2	Vila Harbour, New Hebrides
22.5	10.0	13.3	Nuku'alofa, Tonga Ids.
12.5	6.1	8.3	Manava I., Fiji Ids.

Synonymy—

- 1821 *Mitra lugubris* Swainson, Zoological Illustrations, ser. 1, vol. 1, pl. 66, top and bottom figures (no locality given); 1838 Kiener, *Species générale iconographie coquilles vivantes*, vol. 3, p. 46, pl. 30, fig. 100; 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 10, fig. 72; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 20, pl. 13, figs. 199-201; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 20; 1951 Laseron, *Rec. Austral. Museum*, vol. 22, no. 4, p. 335; 1962 J. Cate, *Veliger*, vol. 4, p. 132, pl. 29, fig. 1; 1965 Cernohorsky, *Veliger*, vol. 8, p. 91, pl. 17, fig. 53.
- 1828 *Voluta lugubris* Wood, *Index Testaceologicus*, Suppl., p. 10, pl. 3, fig. 12a.
- 1882 *Mitra (Chrysame) lugubris* Swainson, Tryon, *Manual Conchology*, vol. 4, p. 149, pl. 44, fig. 284 only; 1923 Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 125.
- 1952 *Mitra* sp. Tinker, *Pacific Sea Shells*, plate facing p. 72, bottom row, fig. on left.
- 1962 *Chrysame lugubris* Swainson, Iredale & McMichael, *Austral. Museum Mem.*, no. 11, p. 63.
- 1962 *Mitra coronata* Lamarck, J. Cate, *Veliger*, vol. 4, p. 132, pl. 29, fig. 2 (non Lamarck, 1811).

Types—The type-specimen of *M. lugubris* Swainson, which was originally in Humphrey's collection, is no longer traceable; we therefore designate the specimen illustrated by Swainson, on plate 66, top and bottom figures, as the lectotype of *M. lugubris*. No locality was given by Swainson, and we designate Manava Island, North Viti Levu, Fiji Islands, which is the approximate centre of the species distributional range, as the type locality of *M. lugubris*.

Records—PHILIPPINE ISLANDS: Boac, Marinduque (Clover coll.). JAPAN: Osimi, Osumi (USNM). PALAU ISLANDS: Koror Island (Cernohorsky coll.). NEW GUINEA: Ela Beach, Port Moresby (Buick coll.). AUSTRALIA: Northwest Australia (WAM); New South Wales (Laseron, 1951; Iredale & McMichael, 1962). NEW CALEDONIA: Isle des Pins (Dautzenberg & Bouge, 1923). LOYALTY ISLANDS: Lifu (IRSN). NEW HEBRIDES: Malapoa Point, Vila Harbour, Efate I. (Cernohorsky coll.). FIJI ISLANDS: Rat Tail Passage, Suva reef, S. Viti Levu (Browne coll.); Navula Passage, Mamanuca group (Jennings coll.; Powell coll.); Manava I., N. Viti Levu; Wadigi I., Mamanuca group; Tavarua Island, W. Viti Levu (all Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (USNM; Cernohorsky coll.). NIUE ISLAND: (McDowall coll.). SOCIETY ISLANDS: Fare Ute Point, Papeete, Tahiti (USNM); Raiatea (DMNH). HAWAIIAN ISLANDS: off Kaanapali, Maui, 4 faths.; off Kewalo, Honolulu, 8-25 faths.; Black Point, Oahu; Pearl Harbour, Oahu (all USNM); Mokulea reef, Oahu (Leehman coll.). MIDWAY ISLANDS: (USNM).

Mitra coronata Lamarck, 1811

(Color pl. 257, figs. 16-18; pl. 386)

Range—East Africa to India, Polynesia and the Hawaiian Islands.

Remarks—The species is very variable in size, sculpture and ornamentation, and has received its fair share of specific and varietal names. In some individuals from the Philippine Islands and Mauritius, the sutures lack the descending white axial streaks and have an uninterrupted, moderately broad white band.

Habitat—On reefs, in crevices, coralline algae, coral-rubble and under coral rocks, from the intertidal region to a depth of 70 fathoms.

Description—Shell up to 35 mm (about 1½ inches) in length, elongate-ovate, fairly solid, sutures distinct and crenulate. Whorls 6-7, apart from an eroded protoconch, spire whorls weakly convex or almost flat-sided, occasionally subangulate at sutures, sculptured with irregular, fine and slender axial riblets on the spire whorls and shallow or moderately deep spiral grooves which become pitted in the interspaces; in individuals with the longitudinal and spiral sculpture of almost equal strength, a granulose sculpture may appear. The penultimate whorl has from 2-7 spirals and the body whorl 11-16, in addition to 6-10 oblique basal cords. The aperture is longer than the spire, moderately narrow but widening slightly anteriorly and smooth within; outer lip weakly convex, only moderately thickened and finely crenulate at the margin. Columella glazed on the parietal wall but calloused anteriorly, and with 5-6 oblique folds; siphonal fasciole straight, slightly calloused, siphonal notch distinct. Fresh specimens are dark brown in colour, occasionally greenish-brown, and ornamented with a narrow, light tan or off-white spiral band anterior to the

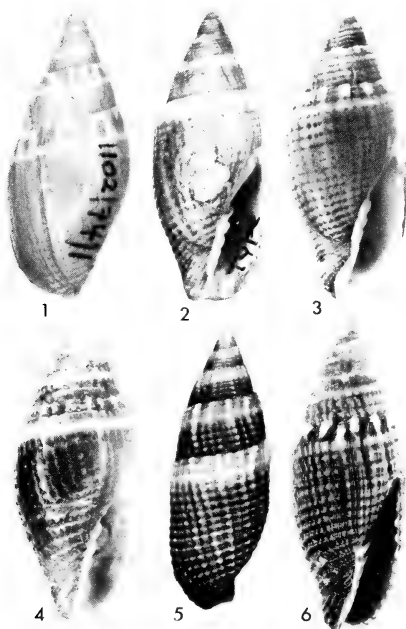
Plate 386. *Mitra (Nebularia) coronata* Lamarck.

Fig. 1. Paralectotype (MHNG 1102/74/1; 23.1 x 10.0 mm).

Fig. 2. Lectotype (MHNG 1102/74/2; 26.0 x 10.5 mm).

Fig. 3. Lectotype of *M. tiarella* A. Adams from Ticao Id., Philippine Ids., 6 fms. (BM (NH) 1967893; 17.7 x 7.1 mm).Fig. 4. Holotype of *M. lugubris honolulensis* Pilsbry from Honolulu Harbour, Hawaiian Ids. (ANSP 46797; 23.0 x 9.7 mm).Fig. 5. Specimen of *M. (N.) coronata* Lamarck from Ticao Id., Philippine Ids. (BM (NH); 31.2 mm).

Fig. 6. Specimen from W. of Nadi, W. Viti Levu, Fiji Ids., 17-20 fms. (Jennings coll.; 19.3 x 7.3 mm).

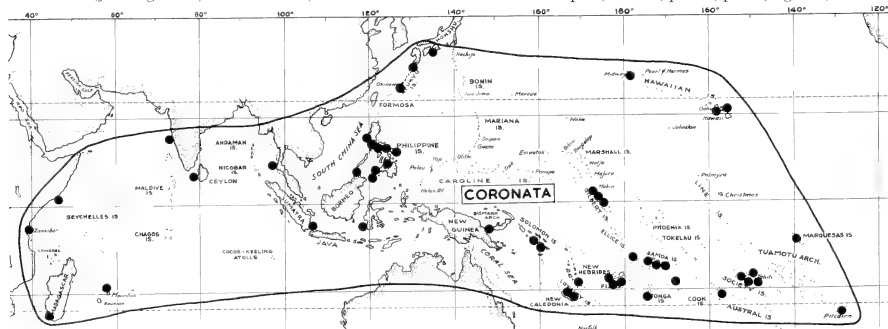
sutures, and whitish, axially oriented coronations which descend onto the subsutural band; some individuals have a broader, uninterrupted whitish band which reaches the sutures. Aperture white, bluish-white, light violet or greyish-brown, parietal wall brown or bluish-white, columellar folds bluish-white. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
28.6	11.8	16.9	Natadola, Fiji Ids.
26.0	10.5	13.9	Lectotype of <i>coronata</i>
23.0	9.7	13.2	Holotype of <i>honolulensis</i>
20.0	8.7	12.0	Santa Cruz, Philippines
17.7	7.1	10.0	Lectotype of <i>tiarella</i>
13.0	5.8	8.6	Lifu, Loyalty Ids.

Synonymy—1795 "*Voluta coronata*" Chemnitz, Syst. Conchylien-Cabinet, vol. 11, p. 24, pl. 178, figs. 1719, 1720 (*non binomial*).

1798 ——— Tableau Encycl. Méthodique, pl. 371, figs. 6a, b.

1811 *Mitra coronata* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 214 (no locality given); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 61, pl. 18, figs. 60, 60a; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 14, figs. 104a, b; 1874 Sowerby (*pars*), Thesaurus Conchyliorum, vol. 4, p. 20, pl. 13, figs. 217, 220 only; 1880 Garrett, Journal of Conchology, vol. 3, p. 13; 1965 Cernohorsky, Veliger, vol. 8, p. 85, pl. 17, figs. 55, 55a-c; 1969, Revue Suisse Zoologie, vol. 76, p. 977, pl. 5, figs. 35a, b (figured type-specimens).1825 *Voluta coronata* Wood, Index Testaceologicus, p. 99, pl. 21, fig. 146a (West Indies = error!) [non Helbling, 1779].1853 *Mitra tiarella* A. Adams, Proc. Zool. Soc. London, pt. 19, p. 133 (Islands of Ticao, Philippines, 6 faths.); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 5, fig. 56 and pl. 13, fig. 215; 1962 J. Cate, Veliger, vol. 4, p. 132, pl. 29, fig. 3 (figured type-specimens of *M. lugubris honolulensis* Pilsbry, 1921).1882 *Mitra (Chrysam) coronata (pars)* Lamarck, Tryon, Manual of Conchology, vol. 4, p. 148, pl. 44, figs. 273-275 and pl. 58, fig. 687 only.1921 *Mitra lugubris honolulensis* Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 72, p. 314, pl. 12, fig. 16 (HonoluluPlate 387. Geographical distribution of *Mitra (Nebularia) coronata* Lamarck.

- Harbour); 1962 J. Cate, Veliger, vol. 4, p. 142, pl. 33, fig. 4 (figured type-specimens).
- 1923 *Mitra (Chrysame) tiarella* A. Adams, Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 133.
- 1923 *Mitra (Chrysame) tiarella* var. *deleta* Dautzenberg & Bouge, *ibid.*, p. 136 (Lifu, Loyalty Islands).
- 1963 *Mitra crassula* "Dall MS", J. Cate, Veliger, vol. 6, p. 39, pl. 8, fig. 48 (nomen nudum).
- 1970 *Mitra (Nebularia) coronata* Lamarck, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 68, pl. 2, fig. 8 (lectotype), fig. 9 (paralectotype).

Types—The lectotype of *M. coronata* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/74/2. The lectotype, here designated, of *M. tiarella* A. Adams and 2 syntypes are in the British Museum (NH) no. 1967839, and the holotype and paratype of *M. lugubris honoluluensis* Pilsbry, are in the Academy of Natural Sciences, Philadelphia, no. 46797. No locality was given by Lamarck and the first correct locality indication of Bohol Island, Philippine Islands, is here designated as the type locality of *M. coronata*.

Nomenclature—Dall's manuscript names of various Hawaiian Mitridae were originally inscribed only on museum labels or were cited by Dall in his correspondence to various collectors. Dall never published these names, and as non-existent names, they cannot be considered *nomina nuda* created by Dall as presumed by J. Cate (1963). Dall's MS. names have subsequently been cited in Hawaiian faunal check-lists and have been published as *nomina nuda* together with photographs of Dall's specimens (not types) by J. Cate (*op. cit.*).

Records—EAST AFRICA: Mogadiscio, Somalia (USNM). ZANZIBAR: (AMNH). MAURITIUS: (BMNH; USNM; Powell coll.). MADAGASCAR: Grand Recife, Tulare, 17 metres. INDIA: Goa (USNM). CEYLON: (USNM). THAILAND: Gog Sindarar Nua = Chance Id. (USNM). INDONESIA: Marudu Bay, Nth. Borneo (USNM); Java Sea, 106°08'E & 5°40'S, 54 m; Samalona, Macassar, Celebes, 35 m (both ZMC). PHILIPPINE ISLANDS: Boac, Marinduque (Lumawig coll.); Caba L., Lubang I., Mindoro; between Siasi I. and Bongao I., Sulu (both USNM); Samar Island; Pangangon I., Bohol (both Steiner coll.); Santa Cruz, Zamboanga (Cernohorsky coll.); Subic Bay, Zambales, Luzon (Clover coll.); Ticao I., Bohol (BMNH). RYUKYU ISLANDS: Okinawa (USNM). JAPAN: Oshima, Osumi, Susami, Wakayama Prefecture (both USNM). NEW GUINEA: Siassi Island (Hinton coll.). LOYALTY ISLANDS: Lifu (USNM; AIM; Powell coll.); Islet Longue, Uvea (USNM). SOLOMON ISLANDS: Treasury Island (USNM); Marau Sound, Guadalcanal (Gower coll. Cernohorsky coll.). NEW HEBRIDES: Black Sands, S.W. Efate I. (Colardeau coll.). GILBERT ISLANDS: Tabuarae I., Onotoa Atoll, Apamama (both USNM); Betio-Bairaki causeway, Tarawa I. (Holmes coll.); Bikenibeu, Tarawa I. (Foreman coll.). FIJI ISLANDS: Bay of Islands, Suva Harbour, S. Viti Levu, 8 faths. (Hill coll.); Natadola, S.W. Viti Levu (Cernohorsky coll.); W. off Nadi, W. Viti Levu, 17-20 faths. (Jennings coll.). WALLIS ISLANDS: Nukuhifala (USNM). SAMOA ISLANDS: Apia Harbour (Cernohorsky coll.); Tutuila Island (USNM); Asau, Savaii (Steiner coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Cernohorsky coll.). NIUE ISLAND: (AIM; McDowall coll.). COOK ISLANDS: Mauke Island (USNM). SOCIETY ISLANDS: Taone, Tahiti; Av-

apathi, Huahine; Point Hauru, N.W. Moorea; Motu I Atara, Tahaa; Motu Iriu, Raiatea; Point Ovauaara, Tahiti (all USNM). MARQUESAS ISLANDS: Taiohae Bay, Nukuhiva (USNM). PITCAIRN ISLANDS: 1 mi. N.W. of Pitcairn Island, 55-70 faths. (USNM). HAWAIIAN ISLANDS: off Makua, Oahu, 7-8 faths. (DMNH; Clover coll.); off Waikiki, Oahu, 33-50 faths.; off Kaaanapali, Maui, 4-12 faths. (both USNM); Sunset beach, Oahu (Leehan coll.; Cernohorsky coll.). MIDWAY ISLANDS: (USNM).

Mitra amaurea Hervier, 1897

(Color pl. 257, figs. 19, 20; pl. 388)

Range—East New Guinea to the Tonga Islands.

Remarks—The species is similar to *M. coronata*, but the sculpture consists of slender axial riblets and bisecting spiral cords which form nodules over the shell's surface; the coronations and white axial lines at the sutures are lacking in *M. amaurea*. The species is rather rare, and the limits of distribution are probably wider than presently known.

Habitat—On reefs, under coral and in crevices within the intertidal zone.

Description—Shell up to 30 mm (1¼ inches) in length, elongate-ovate and solid, some specimens occasionally more fusiform, sutures distinct, very narrowly ledged and undulate through intervening axial riblets. Whorls 5½-7, apart from an eroded protoconch, spire whorls flat-sided or weakly convex, first 4 post-nuclear whorls with pitted spiral grooves, spire becoming obsolete on the last 2 whorls; sculptured with moderately coarse or slender axial riblets which number from 15-22 on the penultimate and from 16-28 on the body whorl, riblets particularly crowded on the back of the outer lip. The spiral sculpture consists

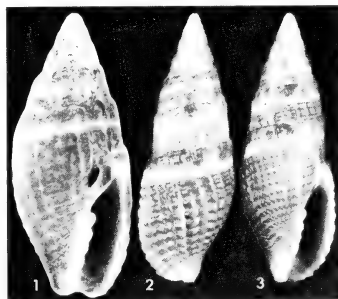


Plate 388. *Mitra (Nebularia) amaurea* Hervier.

Fig. 1. Paratype from Lifu, Loyalty Ids. (IRS: 16.4 mm).
Fig. 2. 3. Specimen from Rat Tail Passage, Suva reef, Fiji Ids.; slender form with short aperture (WOC coll.; 19.6 x 7.0 mm).

of overriding and moderately broad flat spiral cords which form nodules at the point of intersection with the axial riblets, and number from 4-6 on the penultimate and from 13-22 on the body whorl; on the siphonal fasciole the oblique cords become thinner and crowded. Aperture slightly shorter or longer than the spire, narrow and smooth within, outer lip only moderately thickened, descending almost vertically, and minutely crenulate at the margin; columella calloused, and with 4 or 5 oblique folds, siphonal fasciole straight and short, siphonal notch distinct. Fresh specimens are dark brown in colour and have a single pale yellowish-brown subsutural band and some of the nodules are similarly coloured; aperture bluish-grey, columella bluish-white but with a brown patch between the posterior fold and the parietal callus. Periostracum thin, yellowish-brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
26.0	10.0	13.7	Moturina I., New Guinea
23.4	8.5	11.5	Nuku'alofa, Tonga Ids.
22.0	—	—	Syntype of <i>amaura</i>
19.0	7.6	10.4	Suva reef, Fiji Ids.
16.3	7.0	8.8	Anse Vata beach, New Caledonia
15.0	7.0	8.5	Lifu, Loyalty Ids.

Synonymy—

1897 *Mitra amaura* Hervier, Journal de Conchyliologie, vol. 45, p. 60 (Lifu, Loyalty Islands); 1898, *ibid.*, vol. 45, p. 230, pl. 9, figs. 4, 4a, b.

1923 *Mitra (Chrysame) amaura* Hervier, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 113.

Types—A syntype, 22.0 mm in length, is in the Muséum National d'Histoire Naturelle, Paris ("Journal de Conchyliologie" coll.), and other syntypes are in the Dautzenberg collection, Institut Royal des Sciences Naturelle, Brussels. The type locality is Lifu, Loyalty Islands.

Records—NEW GUINEA: Misima Island (Hinton coll.); Moturina Island (Hinton coll.; Cernohorsky coll.). NEW HEBRIDES: Erakor reef, Efate I. (Dale coll.). NEW CALEDONIA: Kuakue Bay (USNM); Anse Vata beach, near Noumea (Cernohorsky coll.). LOYALTY ISLANDS: Lifu (IRS; AIM). FIJI ISLANDS: Bay of Islands, Suva Harbour, S. Viti Levu (Hill coll.); Rat Tail Passage, Suva reef, S. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.).

Mitra aurora subspecies *aurora* Dohrn, 1861

(Pl. 389, figs. 1, 2)

Range—Eastern Polynesia and the Hawaiian Islands.

Remarks—*M. aurora* is a rarer species than the closely related *M. coronata* Lamarck, and both species are sympatric in Mauritius, Polynesia, the Hawaiian Islands and elsewhere in the Pacific. *M. floridula* Sowerby, usually considered as a full species, is only separable as a western Pacific—Indian Ocean subspecies of *M. aurora*. The western subspecies *floridula* usually has a much

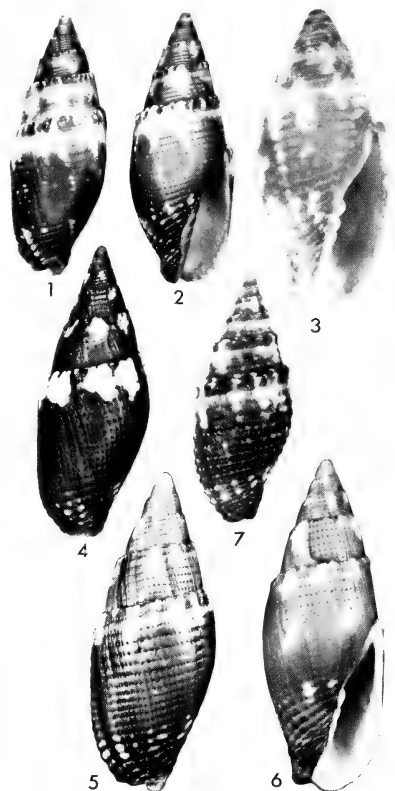


Plate 389. Figs. 1-2. *Mitra (Nebularia) aurora aurora* Dohrn Figs. 3-7. *M. (N.) aurora floridula* Sowerby.

Figs. 1, 2. Lectotype and syntype of *M. (N.) aurora aurora* Dohrn from the Hawaiian Ids. (BM (NH) 1966711; fig. 1 = lectotype, 33.9 x 13.0 mm; fig. 2 = syntype, 35.2 x 12.7 mm).

Fig. 3. Lectotype of *M. (N.) aurora floridula* Sowerby from Mauritius; juvenile specimen (NMW; 23.4 x 11.1 mm).

Figs. 4-6. Specimens from Mauritius with weak spiral sculpture (fig. 4 = BM (NH), 36.0 mm; figs. 5, 6 = WABP coll., 42.0 x 15.2 mm).

Fig. 7. Specimen from Bohol Id., Philippine Ids.; spirally corded form (BM (NH); 23.7 mm).

coarser sculpture than the Polynesian *aurora*, but otherwise the two are similar in size, form and colour.

Habitat—On reefs, under coral and on lava rocks, from the intertidal zone to a depth of 12 fathoms.

Description—Shell up to 45 mm (about 1¾ inches) in length, solid, sutures narrowly channeled, similar to *M. coronata*, but the spiral sculpture is finer and consists of spiral rows of punctate spiral grooves which give rise to flat or feebly elevated spiral cords, which usually become more prominent towards the base of the body whorl; in some individuals the sculpture tends to become obsolete on the dorsal side of the body whorl. The columella is calloused, occasionally thinner on the parietal wall, and has 5-6 oblique folds. Dark orange-red in colour, ornamented with moderately large white blotches which spread out from the white presutural band in both directions; the last whorl has a random speckling of small white spots which towards the base tend to be arranged in an ill-defined spiral band. The aperture is bluish-white or light bluish-grey, the columellar folds are white and the columella is usually flushed with orange-brown on the parietal wall.

Measurements (mm)—

length	width	height of aperture	
35.2	12.7	18.3	Syntype of <i>aurora</i>
33.9	13.0	18.3	Lectotype of <i>aurora</i>
28.3	11.0	13.5	Makua, Hawaiian Ids.
21.0	9.4	11.3	Waimea Bay, Hawaiian Ids.

Synonymy—

1861 *Mitra aurora* Dohrn, Proc. Zool. Soc. London, p. 205,

pl. 26, fig. 3 (Sandwich Islands); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 13, fig. 223; 1880 Garrett, Journal of Conchology, vol. 3, p. 11; 1962 J. Cate, Veliger, vol. 4, p. 132, pl. 29, fig. 4; 1967, Veliger, vol. 10, p. 194, pl. 19, fig. 5 (shell), textfig. 5 (radula).

1882 *Mitra (Chrysame) coronata (pars)* Lamarck, Tryon, Manual Conchology, vol. 4, p. 148, pl. 44, fig. 277 only (non Lamarck, 1811).

1923 *Mitra (Chrysame) tiarella* var. *aurora* Dohrn, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 135.

1933 *Mitra (Chrysame) aurora* Dohrn, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 77, p. 156.

Types—The 3 syntypes of *M. aurora* Dohrn, are in the British Museum (NH) no. 1966711; the 33.9 mm long specimen which resembles the original illustration and closely agrees with Dohrn's given dimensions, is here selected as the lectotype of *M. aurora*. The type locality is the Hawaiian Islands.

Records—COOK ISLANDS: (Garrett, 1880). SOCIETY ISLANDS: Point Teffao, Huahine; Taunua Pass, Tahiti (both USNM). TUAMOTU ISLANDS: Anaa Island (Garrett, 1880). MIDWAY ISLANDS: DMNH. HAWAIIAN ISLANDS: off Nanakuli, Oahu, 6 faths. (Deynzer coll.); Black Point, Oahu; Honolulu Harbour Channel, Oahu; off Kaaanapali, Maui, 4-12 faths.; Keokea, Hilo (all USNM); Waimea Bay, 2 faths. (Cernohorsky coll.); Makua, Oahu; Moanalua Bay, Oahu (both Clover coll.).

***Mitra aurora* subspecies
floridula Sowerby, 1874**

(Color pl. 257, figs. 21, 22; pl. 389, figs. 3-7)

Range—Red Sea to Japan, the Gilbert Islands and Tonga Islands.

Remarks—The subspecies is similar to the Polynesian nominate subspecies in size, form and colour, and differs mainly in features of coarser sculpture. The spiral grooves are generally deeper than in the Polynesian populations

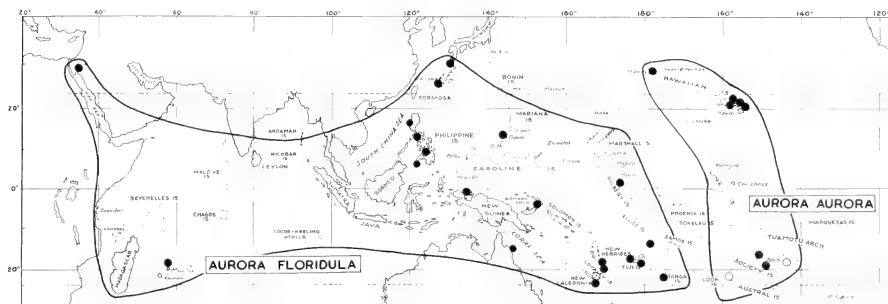


Plate 390. Geographical distribution of *Mitra (Nebularia) aurora aurora* Dohrn, and its subspecies *M. (N.) aurora floridula*

Sowerby.

and the resulting spiral cords become elevated and the grooves concave; this subspecies has also the same "doubled up" coronations at the sutures. In some individuals from Tonga and Mauritius, the grooves are shallow and narrow, and the spiral cords less elevated, and such specimens closely approximate the Polynesian subspecies; in other specimens the grooves are as broad or broader than the spiral cords, and the pittings change into axial lirations. The largest specimen of the subspecies *floridula* examined measured 45.0 mm. Weathered specimens of the subspecies *floridula* are difficult to separate from the Polynesian *aurora*, as the spiral cords are worn down and all that remains of the sculpture are spiral rows of pits.

Habitat—On reefs, under coral and on coral rubble, from the intertidal zone to a depth of 2 fathoms.

Measurements (mm)—

length	width	height of aperture	
42.0	15.2	22.5	Mauritius
41.0	16.0	23.0	Wadigi I., Fiji Ids.
35.2	13.5	20.0	Meli I., New Hebrides
35.0	14.0	19.0	Mauritius
26.0	11.0	15.3	Meli I., New Hebrides
23.4	11.1	15.3	Lectotype of <i>floridula</i>
21.8	10.4	13.8	Suva reef, Fiji Ids.

Synonymy—

1874 *Mitra floridula* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 16, fig. 283 and pl. 27, fig. 611 (Mauritius); 1880 von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 250; 1962 J. Cate, Veliger, vol. 4, p. 132, pl. 29, fig. 5 (immature specimen); 1965 Cernohorsky, Veliger, vol. 8, p. 88, pl. 17, fig. 52, textfig. 5 (radula).

1874 *Mitra coronata* (pars) "Chemnitz", Sowerby, Thesaurus Conchyliorum, vol. 4, p. 20, pl. 13, figs. 218, 219 (Mauritius) (non Lamarck, 1811).

1882 *Mitra (Chrysame) coronata* (pars) Lamarck, Tryon, Manual of Conchology, vol. 4, p. 149, pl. 44, fig. 283 only (non Lamarck, 1811).

1923 *Mitra (Chrysame) floridula* Sowerby, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 121.

1923 *Mitra (Chrysame) tiarella* var. *amplificata* Dautzenberg & Bouge, *ibid.*, p. 135 (Mauritius and Raiatea; Mauritius here designated as the type-locality).

Types—The specimen of *M. floridula* Sowerby, illustrated by the author on plate 16, fig. 283, is no longer traceable; the juvenile specimen from Mauritius, depicted on plate 27, fig. 611 of the "Thesaurus", is in the National Museum of Wales, Cardiff, and is here designated as the lectotype of *M. floridula*. The type locality is Mauritius.

Records—RED SEA: Eilat, Gulf of Aqaba (Hadar coll.; Haim coll.; Steiner coll.). MAURITIUS: (BMNH; NMW; von Martens 1880). PHILIPPINE ISLANDS: Bohol Island (BMNH); Subic Bay, Luzon; Tawi Tawi (both DMNH).

Boac, Marinduque (Lumawig coll.). RYUKYU ISLANDS: Okinawa (USNM). JAPAN: Oshima, Osumi (USNM). MARSHALL ISLANDS: Guam Island (USNM). NEW GUINEA: Biak I., Schouten I. (USNM). NEW BRITAIN: Matupi, Rabaul (Buick coll.; Kleckham coll.); Nordup near Rabaul (USNM). AUSTRALIA: Fairway Channel, Queensland (DMNH). NEW HEBRIDES: Black beach, Tanna I. (USNM); Port Havannah, N. Efate I. (Debant coll.); Malapoa Point, Vila Harbour, Efate I. (Cernohorsky coll.); Meli Bay, Efate I., 2 faths. (Collardeau coll.; Cernohorsky coll.). NEW CALEDONIA: Isle des Pins (IRS). LOYALTY ISLANDS: (Dautzenberg & Bouge, 1923). FIJI ISLANDS: Wadigi I., Mamanuca group (Jennings coll.; Cernohorsky coll.); Rat Tail Passage, Suva reef, S. Viti Levu (Cernohorsky coll.). FUTUNA ISLANDS: Anse de Sigave, Hoorn I. (USNM). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.). GILBERT ISLANDS: Betio-Bairaki causeway, Tarawa I. (Holmes coll.).

***Mitra vultuosa* Reeve, 1845**

(Pl. 391)

Range—Philippine Islands, Melanesia and Micronesia.

Remarks—A rare, reef-dwelling species of which only a few records are known. The typical form is reddish brown in colour, and has only a

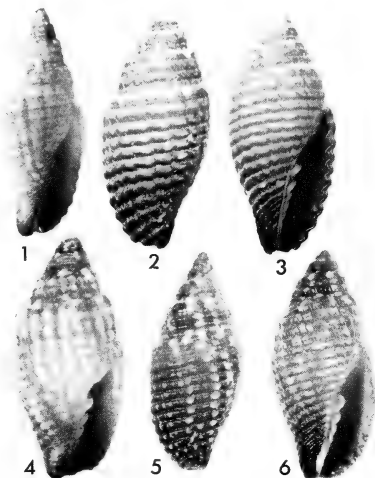


Plate 391. *Mitra (Nebularia) vultuosa* Reeve.

Fig. 1. Lectotype from Capul Id., Philippine Ids. (BM (NH) 1967913; 16.8 x 6.8 mm).

Figs. 2, 3. Specimen from North Luzon, Philippine Ids. (Clover coll.; 15.2 x 6.9 mm).

Fig. 4. Holotype of *M. laeta* A. Adams from Ticao Id., Philippine Ids. (BM (NH) 1967791; 13.1 x 6.1 mm).

Fig. 5. Specimen from Port Havannah, Efate Id., New Hebrides (WOC coll.; 14.8 x 6.4 mm).

Fig. 6. Specimen from Malapoa Point, Efate Id., New Hebrides (WOC coll.; 15.2 x 6.8 mm).

few, small white spots at the sutures, while in the colour form *laeta* A. Adams the small spots are on the nodules and are arranged in a stripe-like fashion.

Habitat—On reefs, under stones and in crevices of coral, from the intertidal zone to a depth of 5 fathoms.

Description—Shell up to 20 mm (about $\frac{3}{4}$ inches) in length, elongate-ovate, body whorl long and spire short, solid, sutures irregular, narrowly channelled and minutely nodulose. Whorls 5-6, apart from an eroded protoconch, spire whorls convex, sculptured with narrow, elevated spiral cords which number from 3-6 on the penultimate and from 14-20 on the body whorl; slender but very feeble axial riblets override the spiral cords and produce small nodules at the point of intersection, and the whole surface has macroscopic longitudinal hair-lines. Aperture longer than the spire, very narrow and smooth within, outer lip moderately thickened, weakly convex and minutely crenulate at the margin. Columella calloused and with 5, rarely 4, oblique and moderately wide-spaced folds; siphonal fasciole straight or slightly recurved, siphonal notch distinct. Dark orange-brown or reddish-brown in colour, ornamented with only a few white spots at the sutures, or with moderately numerous spots upon the nodules which are usually arranged in a stripe-like manner; aperture greyish-brown, columella reddish-brown, folds and interspaces bluish-white to violet.

Measurements (mm)—

length	width	height of aperture	
16.8	6.8	10.1	Lectotype of <i>vultuosa</i>
15.4	6.8	9.5	Vila harbour, New Hebrides
15.2	6.9	9.6	N. Luzon, Philippines
14.7	6.4	8.9	Port Havannah, New Hebrides
13.1	6.1	7.1	Holotype of <i>laeta</i>
11.0	5.4	6.8	Lifu, Loyalty Ids.

Synonymy—

- 1845 *Mitra vultuosa* Reeve, *Conchologia Iconica*, vol. 2, pl. 33, fig. 270 (Island of Capul, Philippines); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 8, pl. 25, fig. 557.
 1853 *Mitra laeta* A. Adams, *Proc. Zool. Soc. London*, for 1851, p. 135 (Ticao, Philippines).
 1882 *Mitra (Scabricola) vultuosa* Reeve, *Tryon, Manual Conchology*, vol. 4, p. 134, pl. 39, fig. 143.
 1895 *Mitra (Chrysam) laeta* Adams, Melville & Standen, *Journal of Conchology*, vol. 8, p. 100; 1923 Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 123.

Types—The lectotype, here designated, and a juvenile syntype of *M. vultuosa* Reeve, B.M. (NH) no. 1967913, and the holotype of *M. laeta* A.

Adams, B.M. (NH) no. 1967791, are in the British Museum (NH). The type locality is Capul Island, Philippine Islands.

Records—PHILIPPINE ISLANDS: Capul Island; Ticao Island (both BMNH); North Luzon (Clover coll.). NEW HEBRIDES: Port Havannah, N. Efate I. (Dale coll.; Cernohorsky coll.); Meli I., Efate I. (Collardeau coll.; Cernohorsky coll.); Malapoa Point, Vila Harbour, Efate I. (Cernohorsky coll.). LOYALTY ISLANDS: Lifu (AIM). CAROLINE ISLANDS: Moen Id., Truk Id. (Salisbury coll.).

***Mitra luctuosa* A. Adams, 1853**

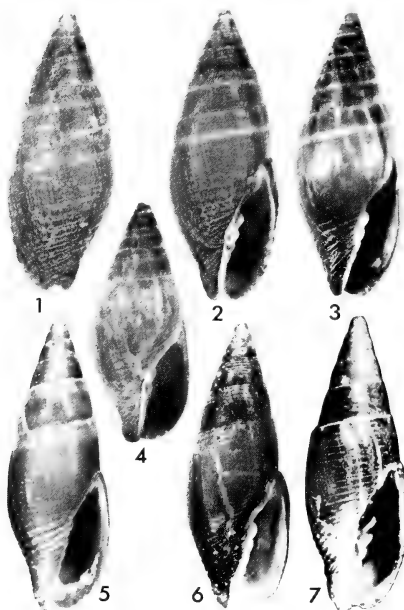
(Pl. 257, figs. 23, 24; pl. 392)

Range—Gulf of Oman and East Africa to Polynesia and the Hawaiian Islands.

Remarks—This widely distributed species is related to *M. coronata* Lamarck, and exhibits the same variability of sculpture and colour ornamentation. The species lacks the calloused, interior protrusion of the outer lip and an assignment to the subgenus *Nebularia* is more appropriate.

Habitat—On reefs, under rocks and coral, in crevices and on coral-rubble, from the intertidal zone to a depth of about 30 fathoms.

Description—Shell up to 35.0 mm (about $1\frac{1}{2}$ inches) in length, but usually between 15-30 mm ($1\frac{1}{4}$ inches), elongate-ovate and only moderately solid, sutures distinct, narrowly ledged and obsoletely minutely crenulate. Whorls 6-8, apart from an eroded protoconch, spire whorls weakly convex, sculptured with shallow, pitted spiral grooves which number from 5-10 on the penultimate and from 10-15 on the body whorl, in addition to the 8-16 oblique cords on the lower third of the body whorl. In some specimens, particularly larger individuals, the spiral grooves are deeper and give rise to spiral cords which are usually more distinct on the dorsal than on the ventral side of the body whorl. Aperture slightly shorter or longer than the spire, moderately narrow and smooth within, outer lip moderately thickened, smooth in grooved specimens but weakly crenulate anteriorly in individuals with distinct basal cords. Columella calloused, and with 4-5 oblique folds, siphonal fasciole short and straight, siphonal notch distinct. Variable in colour, tan to blackish-brown, usually ornamented with a simple, pale yellow or orange-brown subbasal band, which may have additional faint axial streaks descending from the sutures; in some individuals the sutures are only axially spotted, and in others the pale band and spots are absent, and the shell is uniformly dark brown. The aperture is

Plate 392. *Mitra (Nebularia) luctuosa* A. Adams.

Figs. 1, 2. Holotype from the China Seas (BM (NH) 1967804; 22.0 x 8.3 mm).

Fig. 3. Specimen from Inhambane, Mozambique, East Africa (van Hoepen coll.; 21.0 x 8.2 mm).

Fig. 4. Holotype of *M. nigricans* from "Central Pacific Islands"; immature specimen (BM (NH) 1964312; 13.8 x 5.6 mm).

Fig. 5. Lectotype of *M. rubila* A. Adams (BM (NH) 1967873; 31.2 x 12.2 mm).

Fig. 6. Holotype of *M. townsendi* Melvill from Muscat, Gulf of Oman, 7-30 fms. (BM (NH) 19057.14.45; 29.5 x 10.8 mm).

Fig. 7. Lectotype of *M. albocoronata* Schepman from between Loslos and Broken Id., west coast of Salawatti, 18 m (Zool. Mus. Amsterdam; 22.9 x 8.4 mm) [colour slide courtesy of R. Tucker Abbott, DMNH].

greyish-brown or bluish-grey, the parietal wall is brown and the anterior callus and columellar folds are bluish-white to light violet. The periostracum is thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
33.4	12.2	16.6	Nuku'alofa, Tonga Ids.
31.2	12.2	15.6	Lectotype of <i>rubila</i>
29.5	10.8	14.5	Holotype of <i>townsendi</i>
29.0	10.0	14.0	Syntype of <i>lamberti</i>
25.4	9.8	12.8	Samara, New Guinea
25.0	9.0	12.1	Trincomalee, Ceylon

23.0	8.9	12.0	Suva reef, Fiji Ids.
22.9	8.4	—	Lectotype of <i>albocoronata</i>
22.0	8.3	10.8	Holotype of <i>luctuosa</i>
14.8	5.0	6.7	Holotype of <i>astyriformis</i>
13.8	5.6	7.8	Holotype of <i>nigricans</i>
11.8	4.4	6.2	Tahiti, Society Ids.

Synonymy—

- 1853 *Mitra luctuosa* A. Adams, Proc. Zool. Soc. London, for 1851, p. 133 (China Seas); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 14, fig. 229 and pl. 20, fig. 406; 1880 von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 250; 1913 Schepman, Siboga-Expeditie, vol. 49d, p. 267.
- 1853 *Mitra rubila* A. Adams, *ibid.*, p. 137 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 13, fig. 221.
- 1865 *Mitra nigricans* Pease, Proc. Zool. Soc. London, p. 514 (Islands of the central Pacific); 1963 J. Cate, Veliger, vol. 6, p. 38, pl. 7, fig. 41; 1965 Kay, Bull. Brit. Mus. (Nat. Hist.), Zoology, Suppl. 1, p. 82, pl. 14, figs. 11, 12 (figured holotype).
- 1868 *Strigatella nigricans* Pease, American Journ. Conchology, vol. 3, p. 215.
- 1875 *Mitra lamberti* Souverbie, Journal de Conchyliologie, vol. 23, p. 254, pl. 13, fig. 3 (Lifu, Loyalty Islands) [non Fleming, 1828].
- 1888 *Mitra astyriformis* Melvill, Journal of Conchology, vol. 5, p. 282, pl. 2, fig. 13 (no locality given).
- 1904 *Mitra townsendi* Melvill, Proc. Malac. Soc. London, vol. 6, p. 163, pl. 10, fig. 14 (Muscat, Oman, 7-30 fathoms).
- 1913 *Mitra albocoronata* Schepman, Siboga-Expeditie, vol. 49d, p. 269, pl. 22, fig. 6 (Borneo Banks, Indonesia, 59 m and between Loslos and Broken Island, W. coast of Salawatti, 18 m; last locality designated as the type locality).
- 1959 *Mitra (Strigatella) luctuosa* A. Adams, Barnard, Annals South African Museum, vol. 45, p. 44; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 14, textfig. 68 (radula).
- 1963 *Mitra alida* "Dall MS", J. Cate, Veliger, vol. 6, p. 38, pl. 7, fig. 39 (nomen nudum).
- 1963 *Mitra diamantina* "Dall MS", J. Cate, *ibid.*, p. 38, pl. 7, fig. 40 (nomen nudum).
- 1965 *Mitra cf. Mitra nigricans* Pease, Cernohorsky, Veliger, vol. 8, p. 91, pl. 17, fig. 54.

Types—The following types are in the British Museum (NH): the holotype of *M. luctuosa* A. Adams, B.M. (NH) no. 1967804, and the holotype of *M. nigricans* Pease, B.M. (NH) no. 1964312. Three very worn and weathered syntypes of *M. rubila* A. Adams, B.M. (NH) no. 1967873, are in the same Institution; the largest 37.7 mm syntype, appears to be a very worn *M. aurora* Dohrn, and we designate the smaller, 31.2 mm long specimen, which is *M. luctuosa* A. Adams, as the lectotype of *M. rubila*. The holotype of *M. townsendi* Melvill, is in the British Museum (NH) no. 19057.14.45, and the holotype of *M. astyriformis* Melvill, is in the National Museum of Wales, Cardiff. The 2 syntypes of *M. lamberti* Souverbie, are in the Muséum d'Histoire Naturelle, Bordeaux, and two syntypes of *M. albocoronata* Schepman, are in the Zoological Museum, Amsterdam; the smaller and less weathered specimen, length 22.9 mm, which

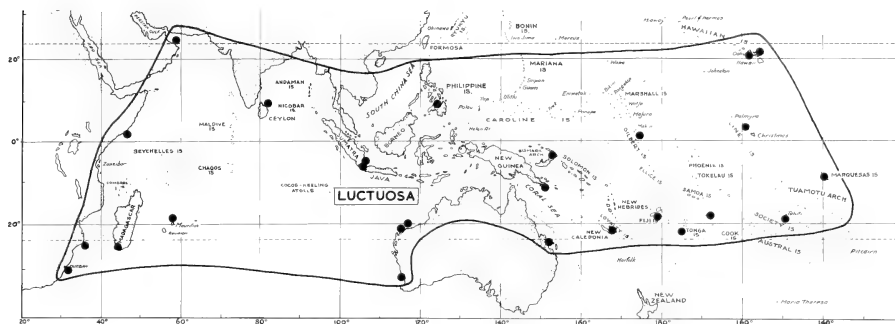


Plate 393. Geographical distribution of *Mitra (Nebularia) luctuosa* A. Adams.

has been illustrated by Schepman, is here selected as the lectotype of *M. albocoronata*. The type locality of *M. luctuosa* is China Seas.

Records—GULF OF OMAN: Muscat, Oman, 7-30 faths. (BMNH). EAST AFRICA: Mogadiscio, Somalia (USNM); Inhambane, Mozambique (van Hoepen coll.). MAURITIUS: (USNM). SOUTH AFRICA: Vetchies Pier, Durban, Natal (Orr coll.); Farquhar Island (Barnard, 1959). MADAGASCAR: Grand Réclife, Tuléar, 10 metres. (Inst. Ocean, Univ. Marseille). CEYLON: Trincomalee (Clover coll.). INDONESIA: Java Sea, 106°08'E & 5°40'S, 54 m; Sunda Strait, 30 m (both ZMC). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.). NEW GUINEA: Samarai (Marrow coll.; Cernohorsky coll.). WEST AUSTRALIA: Bandicoot Bay, 20°52'S & 115°19'E; E. of Cape Poivre, 20°53'S & 115°20'E; Eaglehawk I., Dampier Archipelago, off Cottesloe (all WAM). QUEENSLAND: Miriam Vale (Clover coll.). NEW BRITAIN: Rabaul (Buick coll.). LOYALTY ISLANDS: Lifu (IRSN). FIJI ISLANDS: Bay of Islands, Suva harbour, S. Viti Levu, 8 faths. (Hill coll.); Rat Tail Passage, Suva reef, S. Viti Levu (Cernohorsky coll.). GILBERT ISLANDS: Apamama (USNM). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.). NIUE ISLAND: (McDowall coll.). SOCIETY ISLANDS: Tahiti (Cernohorsky coll.). LINE ISLANDS: Jarvis (DMNH). MARQUESAS ISLANDS: Taiohae Bay, Nukuhiva (USNM). HAWAIIAN ISLANDS: Honokowai, Maui; Honolulu Harbour entrance, Oahu; off Diamond Head, Oahu, 3-5 faths.; Penguin Banks, S. coast of Oahu, 27-29 faths. (all USNM). (Recent record: SEYCHELLES: off Mahé, 5-7 fms. Dale, coll.).

Mitra bomasensis K. Martin, 1916

(Pl. 394, fig. 1)

Range—Lower Miocene of Java, Indonesia.

Remarks—The species bears some similarity to the Recent *M. luctuosa* A. Adams. The translated and abridged original description is as follows:

"Shell thick and spindleform, protoconch not preserved, central whorls weakly convex, sculptured with up to 7 fine and punctate spiral

lines, spiral grooves occasionally with fine axial striae. Aperture equal in height or longer than the spire, aperture narrow and elongated, constricted posteriorly but widening anteriorly; columella calloused and weakly concave and with 4-5 columellar folds, outer lip thin. Body whorl constricted anteriorly and obliquely corded on its lower third".

The only measurement given by the author is length 19.0 mm.

Synonymy—

1916 *Mitra* (*s. str.*) *bomasensis* Martin, Samml. geol. Reichsmus. Leiden, N.F., vol. 2, p. 235, pl. 1, figs. 24, 25 (Kembang Sokkoh, West Progo beds, Java, L. Miocene; type in Rijksmuseum, Leiden); 1931 van der Vlerk, Leidsche geol. Meded., vol. 5, p. 225.

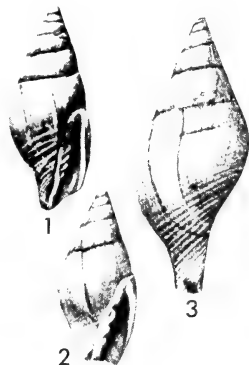


Plate 394. Indonesian Tertiary *Nebularia*.

Fig. 1. *Mitra (Nebularia) bomasensis* K. Martin. Kembang Sokkoh, W. Progo beds, L. Miocene of Java (from K. Martin, 1916, pl. 1, fig. 24; c. 19.0 mm).

Figs. 2, 3. *M. (N.) kelirensis* K. Martin. Kembang Sokkoh, W. Progo beds, L. Miocene of Java (from K. Martin, 1916, pl. 1, figs. 26, 27; fig. 2 = 14.0 mm; fig. 3 = 11.0 mm).

***Mitra kelirensis* K. Martin, 1916**

(Pl. 394, figs. 2, 3)

Range—Lower Miocene of Java, Indonesia.

Remarks—The species is very similar to *M. bomasensis* Martin, from the same deposits, except that the siphonal canal is more slender and longer. Martin separated the species from *M. bomasensis* on characters of flatter whorls, finer sculpture and the absence of a siphonal callus.

The measurements from the figures are as follows: incomplete specimen 14.0 mm in length; enlarged dorsal view of specimen 11.0 mm.

Synonymy—

1916 *Mitra* (*s. str.*) *kelirensis* Martin, Samml. geol. Reichsmus. Leiden, N.F., vol. 2, p. 236, pl. 1, figs. 26, 27 (Kembang Sikkoh, West Progo beds, Java, L. Miocene; type in Rijksmuseum, Leiden); 1931 van der Vlerk, Leidsche geol. Meded., vol. 5, p. 226.

***Mitra punctostriata* A. Adams, 1855**

(Pl. 395)

Range—Gulf of Aden to the Gulf of Oman, India and Ceylon.

Remarks—The species has been recorded by E. A. Smith (1903) from Natal, South Africa, and in a later paper has been illustrated by him (1906). The figured specimen is not the species *M. punctostriata* and appears to be *M. latruncularia* Reeve. Turton (1932) nor Barnard (1959) record the species from South Africa. The species is rare, and all specimens examined were partially weathered and faded.

Habitat—Unknown.

Description—Shell up to 25 mm (1 inch) in length, elongate-ovate, solid, suture of body whorl obsoletely nodulose. Whorls 5½-6, apart from an eroded protoconch, spire whorls regularly convex, sutures distinctly impressed and narrowly channeled; sculptured with shallow, punctate spiral grooves which number from 4-8 on the penultimate and up to 11 on the body whorl, lower third of last whorl with up to a dozen prominent and oblique spiral cords. Aperture narrow, slightly longer than the spire, smooth within, outer lip thickened, and with 4-6 small and obsolete denticles anteriorly; columella calloused, and with 4-5 prominent, oblique folds, siphonal fasciole straight, siphonal notch distinct. Tan to light brown in colour, fresh specimens probably darker, presutural area with a pale band and small white spots at the sutures, aperture and columella creamy-white.

Measurements (mm)—

length	width	aperture	
21.5	8.4	12.6	Holotype of <i>punctostriata</i>
21.4	8.1	11.8	Holotype of <i>marginata</i>
20.2	8.7	12.0	Trincomalee, Ceylon
20.0	8.3	11.0	Trincomalee, Ceylon

Synonymy—

1855 *Mitra punctostriata* A. Adams, Proc. Zool. Soc. London, p. 134 (Ceylon); 1882 Tryon, Manual Conchology, vol. 4, p. 159.

1874 *Mitra marginata* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 17, fig. 311 (no locality given); 1902 Shopland, Proc. Malac. Soc. London, vol. 5, p. 173 (non *M. marginata* Lamarck, 1803).

1882 *Mitra coronata* (pars) Lamarck, Tryon, Manual Conchology, vol. 4, p. 149, pl. 44, fig. 282 only (non Lamarck, 1811).

1901 *Mitra* (*Chrysame*) *marginata* Melvill, Proc. Zool. Soc. London, p. 420 (non Lamarck, 1803).

Types—The holotype of *M. punctostriata* A. Adams, B.M. (NH) no. 1967851, and the holotype of *M. marginata* Sowerby (non Lamarck), B.M. (NH) no. 1879.2.26.135, are in the British Museum (NH). The type locality is Ceylon.

Records—GULF OF ADEN: Steamer Point, Aden (Shopland, 1902). GULF OF OMAN: Charbar (Melvill, 1901). INDIA: Travancore (NMW). CEYLON: (USNM); Trincomalee (Cernohorsky coll.).

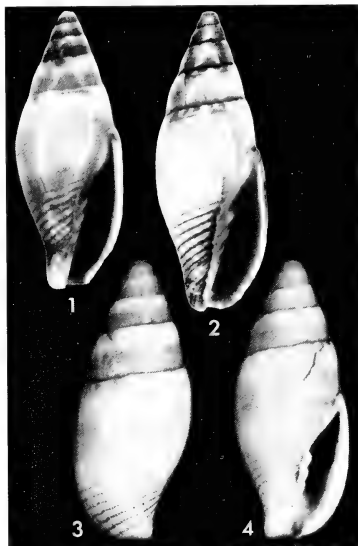


Plate 395. *Mitra* (*Nebularia*) *punctostriata* A. Adams.

Fig. 1. Holotype from Ceylon (BM (NH) 1967851; 21.5 x 8.4 mm).

Fig. 2. Holotype of *M. marginata* Sowerby (BM (NH) 1879.2.26.135; 21.4 x 8.1 mm).

Figs. 3, 4. Specimen from Trincomalee, Ceylon; worn specimen (WOC coll.; 20.0 x 8.3 mm).

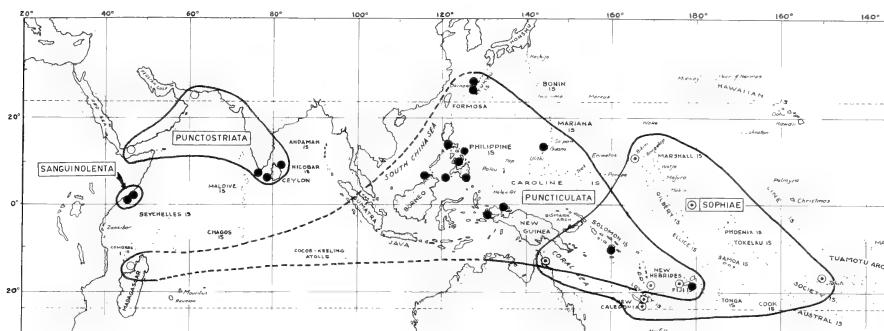


Plate 396. Geographical distribution of the species *Mitra* (*Nebularia*) *punctostriata* A. Adams, *M. (N.) puncticulata* Lamarck, *M. (N.) sanguinolenta* Lamarck, and *M. (N.) sophiae* Crosse.

Mitra puncticulata Lamarck, 1811

(Color pl. 257, figs. 30, 31)

Range—Madagascar to the Ryukyus and the Fiji Islands.

Remarks—This is an uncommon but easily recognized species with coarsely coronate sutures, spiral cords and axial striae, and a colour pattern of yellow, orange, burnt-brown with milky-white spots.

Habitat—On reefs, under stones and coral, and on a sand substratum, from the intertidal zone to a depth of 8 fathoms.

Description—Shell up to 52 mm (about 2 inches) in length, elongate-ovate, solid, spire short, sutures prominently ledged and sculptured with coarse, irregular and upswept coronations. Whorls $5\frac{1}{2}$ -6 $\frac{1}{2}$, apart from an eroded protoconch, spire whorls flat-sided or weakly convex and angulate at the sutures, sculptured with axially lirate spiral grooves which produce flat or slightly elevated and occasionally rounded spiral cords; cords number from 4-5 on the penultimate and from 16-18 on the body whorl. The whole surface is covered with slender, longitudinal riblets. Aperture longer than the spire, narrow and smooth within, outer lip descending almost vertically, thickened and bluntly undulate at the margin; columella calloused and with 4-5 moderately wide-spaced oblique folds, siphonal canal straight or slightly recurved, calloused and occasionally with a twist, siphonal notch deep. Base colour cream, ornamented with orange and burnt brown axial streaks which tend to form 2 broad

transverse bands on the body whorl, coronations white, occasional grooves dark brown, whorls occasionally with milky-white spots; aperture and anterior of columella and folds creamy-yellow to light orange, parietal wall cream or white.

Measurements (mm)—

length	width	height of aperture	
52.0	—	—	Ryukyu Islands
38.8	15.5	23.5	Holotype of <i>puncticulata</i>
37.9	16.0	22.0	Bay of Islands, Fiji Ids.
35.2	15.2	21.6	Guam I., Marianas
33.5	13.7	20.7	Guadalcanal, Solomons
30.5	13.5	19.8	Siasi I., Philippines

Synonymy—

- 1811 *Mitra puncticulata* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 198 (Indian Ocean); 1838 Kiener, Species générale iconographie coquilles vivantes, vol. 3, p. 10, pl. 7, fig. 20; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 3, fig. 19; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 2, pl. 1, figs. 8, 9; 1880 von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 250; 1882 Tryon, Manual of Conchology, vol. 4, p. 115, pl. 33, fig. 25; 1935 Dautzenberg, Mem. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 59 (extended synonymy); 1936 Hirase, Collect. Japanese shells, p. 70, pl. 100, fig. 11; 1965 Cernohorsky, Veliger, vol. 8, p. 95, pl. 13, fig. 5; 1969, Revue Suisse Zoologie, vol. 76, p. 955, pl. 1, fig. 2 (figured holotype).
- 1822 *Mitra diadema* Swainson, Catalogue Coll. Mrs. Blish, App. p. 9 (no locality given).
- 1825 *Voluta serpentina* Wood, Index Testaceologicus, p. 99, pl. 21, fig. 138a (no locality given) (non *Mitra serpentina* Lamarck, 1811).
- 1962 *Nebularia puncticulata* (Lamarck), Kira, Shells west Pacific in Colour, vol. 1, p. 99, pl. 35, fig. 13; 1967 Habe & Kosuge, Stand. Book Japanese Shells in colour, vol. 3, p. 86, pl. 33, fig. 29.

Types—The holotype of *M. puncticulata* is in the Muséum d'Histoire Naturelle, Geneva, no. 1102/43. The type locality is Indian Ocean.

Records—MADAGASCAR: (von Martens, 1880). INDONESIA: Mandi Darrah, N. Borneo (USNM). PHILIPPINE ISLANDS: Catbalogan, Samar I.; Catalogan, Luzon I. (both DMNH); Davao, Mindanao (USNM); Siasi, Sulu Sea (Deynzer coll.; Cernohorsky coll.); near Cebu City, Cebu I. (Powell

coll.). RYUKYU ISLANDS: Shuri, Okinawa; S. Kunigami-Gun, Okinawa (both USNM); Kadena, Okinawa (AMNH); White beach, Okinawa (Cernohorsky coll.). MARIANAS: Guam Island (Clover coll.; Devnzer coll.; Cernohorsky coll.). NEW GUINEA: Boensaki I., Soepiori I., Schouten I. (ANSP). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.; Cernohorsky coll.). FIJI ISLANDS: Bay of Islands, Suva harbour, S. Viti Levu (Cernohorsky coll.).

***Mitra sanguinolenta* Lamarck, 1811**

(Pl. 397)

Range—East Africa.

Remarks—The species is closely related to *M. puncticulata* Lamarck, but lacks the wide-spaced, upcurved coronations of that species and has small, close-set nodules at the sutures; the two main colours are cream and reddish-brown. The species is known only from Somalia, and the actual range of the species is unknown.

Habitat—Unknown.

Description—Shell up to 31 mm (about 1¼ inches) in length, elongate-ovate, solid, sutures narrowly ledged and sculptured with close-set, nodulose crenulations. Whorls 4½-6, apart from

1½ worn nuclear whorls, spire whorls weakly convex and slightly subangulate at the sutures, sculptured with deeply pitted spiral grooves which produce flat or slightly elevated spiral cords; the grooves number from 4-5 on the penultimate and from 10-13 on the body whorl, apart from 7-8 oblique spiral cords at the base. The whorls have broad, irregular and feeble axial folds which may become obsolete on the lower half of the body whorl or may persist to the aperture. Aperture longer than the spire, narrow and smooth within, outer lip thickened and presumably smooth; columella calloused anteriorly, parietal wall thinned, columella with 4 oblique folds. Siphonal fasciole short and straight, calloused and slightly twisted, siphonal notch distinct. White in colour, ornamented with reddish-brown axial streaks and lines in the grooves on the penultimate whorl, and on the body whorl the axial flames form transverse bands and occasional lines in the grooves; some specimens have additional, horizontally oriented white spots on the cords, and an overall cream-coloured cast may be present. The aperture is cream to yellow and the columella is cream and flushed with orange-brown.

Measurements (mm)—

length	width	height of aperture	
30.5	11.0	—	Holotype of <i>sanguinolenta</i>
24.3	10.0	14.0	N. of Mogadiscio, Somalia
23.0	9.0	13.0	N. of Mogadiscio, Somalia
21.3	8.6	12.0	N. of Mogadiscio, Somalia

Synonymy—

1811 *Mitra sanguinolenta* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 200 (Probably Southern Ocean = error!); 1838 Kiener, Spécies général iconographie coquilles vivantes, vol. 3, p. 19, pl. 14, fig. 45; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 3, pl. 11, fig. 160; 1962 J. Cate, Veliger, vol. 5, p. 80, pl. 11, fig. 2 (figured holotype). 1966 *Mitra prosanguinolenta* J. Cate, Veliger, vol. 9, p. 239, pl. 23, figs. 1-3 only (Harbour of Mogadiscio, Somalia, E. Africa) [substitute name for *M. sanguinolenta* Lamarck, 1811]; 1967, Veliger, vol. 9, p. 442.

Types—The holotype of *M. sanguinolenta* Lamarck, is in the Muséum National d'Histoire Naturelle, Paris. The type locality (designated by J. Cate, 1966) is Mogadiscio Harbour, Somalia, East Africa.

Nomenclature—*M. prosanguinolenta* J. Cate, is a superfluous substitute name, since Lamarck's taxon is neither a primary nor a secondary homonym of any existing prior name.

Records—EAST AFRICA: Mogadiscio Harbour, Somalia; at 19 km N. of Mogadiscio, Somalia (both AMNH).

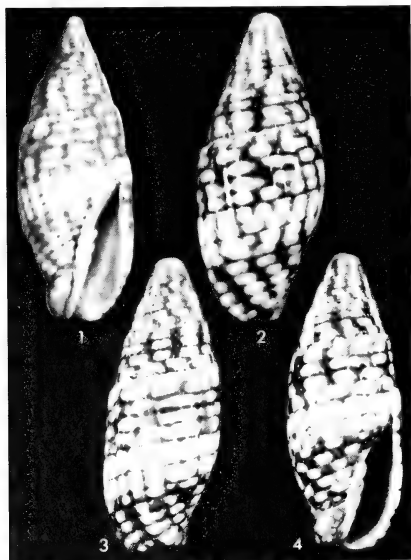


Plate 397. *Mitra (Nebularia) sanguinolenta* Lamarck.

Fig. 1. Holotype (MHNP; 30.5 x 11.0 mm).

Figs. 2-4. Specimens from Mogadiscio, Somalia, East Africa (AMNH 148057; fig. 2 = 24.3 x 10.0 mm; figs. 3, 4 = 23.0 x 9.0 mm).

***Mitra sophiae* Crosse, 1862**

(Pl. 398)

Range—Australia and Marshall Islands to New Caledonia and the Society Islands.

Remarks—This rare species appears to be confined to the Pacific Ocean according to available locality records.

Habitat—On reefs, under coral and on a coral-rubble substratum, from the intertidal zone to a depth of 30 fathoms.

Description—Shell up to 41 mm (about 1½ inches) in length, elongate-ovate, solid, sutures distinct and sculptured with very irregular and coarse coronations which are usually paired in 2 rows. Whorls 7-9, inclusive of the worn protoconch, body whorl long, spire whorls flat-sided and angulate at the sutures; sculptured with elevated and rounded spiral cords which number from 2-4 on the penultimate and from 15-20 on the body whorl. The spiral grooves are broader than the cords and the shell has prominent longitudinal ridges which bisect the spiral cords and become somewhat nodulose at the point of intersection; the longitudinals are rather feeble on the early spire whorls. Aperture longer than the spire, narrow and smooth within, outer lip descending almost vertically and only slightly convex, thickened and bluntly denticulate at the margin; columella prominently calloused, and with 5-6 oblique folds, siphonal fasciole straight or slightly recurved and calloused, siphonal notch deep. Orange-brown in colour, sutural coronations and occasional nodules white; some specimens, however, are cream in colour and have 2 broad, brown bands on the body whorl and a single band adjoining the sutures on the spire whorls. The aperture and columella are porcellaneous-white.

Measurements (mm)—

length	width	height of aperture	
40.5	16.4	24.3	Holotype of <i>sophiae</i>
27.2	12.5	16.8	Momi reef, Fiji Ids.
25.4	11.2	15.3	Momi reef, Fiji Ids.

Synonymy—

1862 *Mitra sophiae* Crosse, Journal de Conchyliologie, vol. 10, p. 253, pl. 10, fig. 6 (New Caledonia); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 13, pl. 24, fig. 546; 1882 Tryon, Manual Conchology, vol. 4, p. 115, pl. 33, fig. 26; 1923 Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 92; 1965 Cernohorsky, Veliger, vol. 8, p. 98, pl. 14, fig. 13.

Types—The holotype of *M. sophiae* is in the British Museum (NH) no. 1902.5.28.69. The type locality is New Caledonia.

Records—AUSTRALIA: Tryon Id., Queensland (Eker, coll.). MARSHALL ISLANDS: Bikini lagoon, Bikini Atoll, 25-30 faths. (USNM). NEW HEBRIDES: Teuma Bay, S. Efate I. (Holmes coll.). LOYALTY ISLANDS: Lifu (Dautzenberg & Bouge, 1923). NEW CALEDONIA: (BMNH; IRSN). FIJI ISLANDS: Momi shore reef, W. Viti Levu (Jennings coll.); Nananu-i-Ra Id., Viti Levu. SOCIETY ISLANDS: Raiatea Islands (Deynzer coll.).



Plate 398. *Mitra (Nebularia) sophiae* Crosse.

Figs. 1, 2. Holotype from New Caledonia (BM (NH) 1902.5.28.69; 40.5 x 16.4 mm).

Figs. 3, 4. Specimen from Momi reef, W. Viti Levu, Fiji Ids. (Jennings coll.; fig. 3 = 25.4 x 11.2 mm; fig. 4 = 27.2 x 12.5 mm).

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

West American species

Mitra crenata (Broderip, 1836)

(Pl. 399)

Range—Gulf of California to Ecuador, Galapagos Islands.

Remarks—This uncommon species has been re-discovered in recent years but records are not numerous. Dushane & Poorman (1967) report the species as common as Guaymas, Mexico. *M. crenata* has a small, dark brown shell which is sculptured with thin spiral cords and finely axially striate spiral grooves.

Habitat—Under rocks and on a gravel and rock substratum, from 3 to 30 fathoms.

Description—Shell up to 11 mm (about ½ inch) in length, elongate-ovate, spire acuminate, moderately light in weight, sutures distinct and simple. Whorls 5-6, apart from a protoconch of 2½ fawn to light brown, smooth nuclear whorls, spire whorls flat-sided, sculptured with thin and thread-like or slightly broader and flat-topped spiral cords, which number from 3-4 on the penultimate and from 15-18 on the body whorl; the grooves are broader than the spiral cords and are very finely axially striate. The body whorl, and occasionally the penultimate whorl, have obsolete axial folds. Aperture equal in height or longer than the spire, narrow and smooth within, outer lip moderately thin, convex and crimped at the margin; columella weakly calloused, callus more prominent anteriorly, and with 3-4 oblique folds. Siphonal fasciole straight, siphonal notch distinct. Tan to dark brown in colour, occasional specimens with a very faint pale zone at the body whorl suture, aperture and columella brown.

Measurements (mm)—

length	width	height of aperture	
11.1	4.5	6.4	Syntype of <i>crenata</i>
10.3	3.9	5.7	Lectotype of <i>crenata</i>
7.8	3.2	4.5	Agua Verde Bay, Gulf of California

Synonymy—

- 1836 *Tiara crenata* Broderip, Proc. Zool. Soc. London, pt. 3, p. 196 (Xipixapi, W. Colombia, 6 fathoms).
 1845 *Mitra crenata* Swainson, Reeve, Conchologia Iconica, vol. 2, pl. 34, fig. 284; 1864 Carpenter, Rept. Brit. Assoc. Adv. Science, for 1863, p. 110; 1874 Sowerby, Thesaurus Con-

chylorum, vol. 4, p. 12, pl. 25, fig. 563; 1967 Dushane & Poorman, Veliger, vol. 9, p. 432.
 1882 *Mitra (Chrysame) crenata* Swainson, Tryon, Manual of Conchology, vol. 4, p. 151, pl. 44, fig. 295.
 1958 *Mitra* (& *Strigatella*) *crenata* Broderip, Keen, Sea shells trop. W. America, p. 429, fig. 653; 1964 Shasky & Campbell, Veliger, vol. 7, p. 118, pl. 22, fig. 15; 1971 Keen, Sea shells trop. W. America, ed. 2, p. 640, fig. 423 (figured holotype = syntype!).

Types—The 2 syntypes of *M. crenata* (Broderip), are in the British Museum (NH) no. 1966420. Keen (1971) illustrated the larger syntype as the "holotype", but Broderip did not separate a holotype nor was it marked as such by the author. We therefore select the smaller, 10.3 mm long, complete and more mature syntype as the lectotype of *M. crenata*. The type locality is Xipixapi [= Jipijapa], Ecuador.

Records—GULF OF CALIFORNIA: Cabo San Lucas, Baja California, Isla Partida; Agua Verde Bay; Carmen Island, 4-5 faths.; Amortajada Anchorage, San José Island (all USNM); off Monseratte Island; Loreto Channel, between Baja California and Carmen Island; off Las Palmas, 55 mi. S. of La Paz, 55 m (all Shasky & Campbell, 1964); Guaymas, 10-30 faths. & 6-12 m (Dushane & Poorman, 1967). PANAMA: Panama City; Taboga Island (both USNM). ECUADOR: Jipijapa, 6 faths. (BMNH). GALAPAGOS ISLANDS: fide Gale Sphon, The Nautilus, in press.

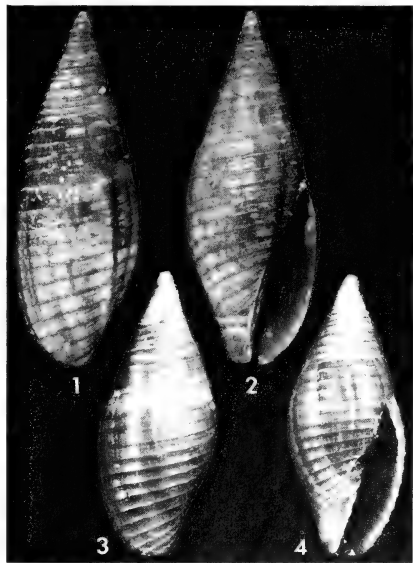


Plate 399. *Mitra (Nebularia) crenata* (Broderip).

Figs. 1, 2. Lectotype from Xipixapi [= Jipijapa], Ecuador (BM (NH) 1966420; 10.3 x 3.9 mm) [photo courtesy of J. Taylor, BM (NH)].

Figs. 3, 4. Specimen from Agua Verde Bay, Gulf of California (USNM 268714; 7.8 x 3.2 mm).

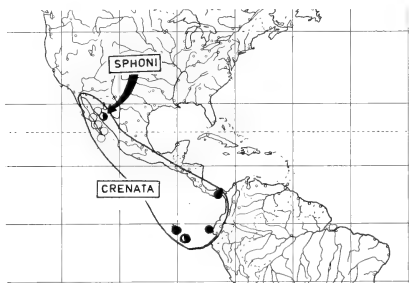


Plate 400. Geographical distribution of the species *Mitra* (*Nebularia*) *crenata* (Broderip) and *M. (N.) sphoni* Shasky and Campbell.

***Mitra sphoni* Shasky and Campbell, 1964**
(Pl. 401)

Range—Baja California and the Galapagos Islands.

Remarks—The species is similar to *M. crenata* (Broderip), but is larger, more solid, slender and fusiform, the spiral cords are coarser and undulate; the siphonal canal is more slender and calloused, but similarly to *M. crenata*, the body whorl tends to develop obsolete axial folds.

No living specimens were originally collected at the type-locality, but living examples were subsequently collected by D. R. Shasky at Pulmo reef, Baja California and Tres Marias Islands (D. R.

Shasky, *in litt.*); these subsequent records are not shown on the distributional map.

Habitat—Under rocks and on a gravel substratum, from 1 to 17 fathoms.

Description—Shell up to 26 mm (about 1 inch) in length, fusiformly-elongate, solid, sutures moderately distinct but weakly impressed. Whorls 5½-7, apart from a worn protoconch, spire whorls almost flat-sided or weakly convex, sculptured with coarse, narrow and undulate spiral cords which number 4-5 on the penultimate and from 18-22 on the body whorl. The interspaces of the cords are broad and V-shaped, and either almost smooth or prominently axially striate; some individuals have feeble axial folds which are produced by irregular axial growth-striae. Aperture narrow, about equal in height or slightly longer than the spire, smooth within; outer lip moderately thickened and crimped at the edge, lower half of columella calloused, and with 4-5 strong, oblique folds. Siphonal notch distinct, siphonal canal straight or slightly recurved, siphonal fasciole occasionally calloused. Tan to brown in colour under a dark brown periostracum, lower half of body whorl occasionally a lighter tan on the ventral side; aperture and columella fawn to greyish brown.

Measurements (mm)—

length	width	height of aperture	
25.6	10.0	13.9	Galapagos Ids.
23.3	8.0	—	Holotype of <i>sphoni</i>
16.8	6.0	8.7	Guaymas, Sonora, Mexico

Synonymy—

1964 *Mitra* (*Strigatella*) *sphoni* Shasky & Campbell, Veliger, vol. 7, p. 118, pl. 22, figs. 13, 14.

1967 *Mitra sphoni* Shasky & Campbell, Dushane & Poorman, Veliger, vol. 9, p. 432.

1971 *Mitra* (? *Strigatella*) *sphoni* Shasky & Campbell, Keen, Sea shells trop. W. America, ed. 2, p. 642, fig. 1428 (figured holotype).

1976 *Subcancilla sphoni* (Shasky & Campbell), Sphon, The Nautilus, vol. 90, no. 2, p. 63. (Galapagos).



Plate 401. *Mitra* (*Nebularia*) *sphoni* Shasky and Campbell. N.W. of Bahía Saladita, Guaymas, Sonora, Mexico. (from Shasky & Campbell, 1964, pl. 22, figs. 13, 14; fig. 1 = holotype, 23.3 x 8.0 mm; fig. 2 = paratype, c. 13.0 mm.)

Types—The holotype of *M. sphoni* is in the Paleontological type collection, Stanford University, no. 9743. The type locality is the first shallow cove N.W. of Bahía Saladita, approximately midway between Punta Colorada and Punta Lobos, Guaymas, Sonora, Mexico, 27°53'15"N & 110°59'W, 2-15 m.

Records—MEXICO: Pulmo reef, Cabo Pulmo, Baja California, 4-5 fms.; between Punta Colorada and Punta Lobos, Sonora, 5-7 fms.; Maria Madre Id., Tres Marias Ids. (all Shasky coll.). GALAPAGOS ISLANDS: (Parkinson, coll.).

Mitra lens (Wood, 1828)

(Color pl. 257, figs. 25-27; pl. 402)

Range—Gulf of California to the Galapagos Islands, Ecuador and possibly Peru.

Remarks—*M. lens* is one of the most commonly encountered west American species of the subgenus *Nebularia*. It is distinguished by its coarse axial folds, spiral cords and usually 2-3 spiral rows of deep pits between the axial ribs. These pits, however, are by no means a constant feature, and in some specimens there is only a shallow depression indicating where the pits would have been, while in others the pits are obsolete or even absent. In one of the syntypes of *M. foraminata* (Broderip), the pits are very shallow on the dorsal side of the body whorl, absent on the penultimate whorl and distinct again on some of the spire whorls. In the very worn holotype of *M. lignaria* Reeve, the pits are obsolete, but under magnification depressions between the ribs are still discernible.

Habitat—Under rocks and stones and on a mud and gravel substratum, from the intertidal zone to a depth of 14 fathoms.

Description—Shell up to 80 mm (about 3¼ inches) in length, heavy and solid, sutures distinct

and adpressed. Whorls 6-7½, apart from an eroded protoconch, spire whorls convex, sometimes giving the impression of being slightly subangulate at the sutures by the appearance of a subsutural cord. Post-nuclear whorls with axial riblets and usually 3, rarely 4, spiral threads which override the axial riblets, axial folds becoming broad and irregular on the last 2-3 whorls, and number from 8-13 on the penultimate and from 9-16 on the body whorl. The spiral threads are usually weak in the interspaces of the axial folds and usually leave behind 1-3 spiral rows of deep pits anteriorly to the sutures, and occasionally between the basal spiral cords. The spiral sculpture, however, becomes sometimes weak on the last 2 whorls, and in some individuals the deep pits are shallow or even obsolete. Aperture shorter or longer than the spire, smooth within, outer lip descending almost vertically and occasionally angulate anteriorly in mature specimens, thickened and bluntly undulate at the margin through the intrusion of the spiral cords. Columella calloused, callus occasionally laminate anteriorly, forming a shallow fissure at the tip of the siphonal fasciole, columella with generally 4 very strong, oblique folds. Siphonal fasciole corded and calloused, siphonal notch prominent. Cream, fawn to bluish-grey under a dark brown, opaque and longitudinally striate periostracum; aperture greyish-white, occasionally lined with brown near the margin of the outer lip, columellar folds greyish-white, parietal wall occasionally flushed with brown.

Measurements (mm)—

length	width	height of aperture	
65.0	24.0	30.7	Mazatlan, Mexico
64.0	24.1	33.0	Lectotype of <i>foraminata</i>
53.0	19.3	26.0	San Juan del Sur, Nicaragua

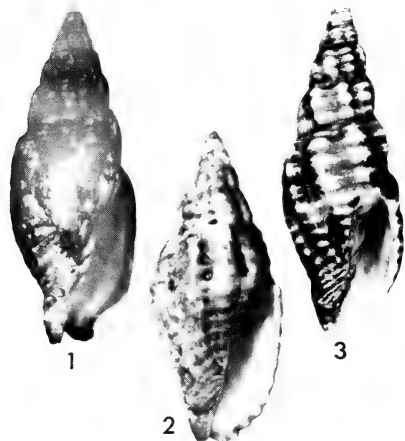


Plate 402. *Mitra (Nebularia) lens* (Wood).

Fig. 1. Lectotype of *M. foraminata* (Broderip) from the west coast of America (BM (NH) 1966421; 64.0 x 24.0 mm).

Fig. 2. Syntype of *M. dupontii* Kiener; juvenile specimen (MHNG; 32.0 mm).

Fig. 3. Holotype of *M. lignaria* Reeve from St. Elena, Ecuador; worn specimen (BM (NH) 1967798; 47.8 x 6.7 mm).

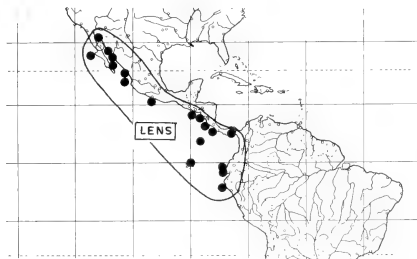


Plate 403. Geographical distribution of *Mitra (Nebularia) lens* (Wood).

47.8	16.7	22.5	Holotype of <i>lignaria</i>
40.5	15.5	20.8	Panama
37.7	14.8	20.3	Guaymas, Mexico
35.0	15.5	19.2	Lectotype of <i>dupontii</i>

Synonymy—

- 1828 *Voluta lens* Wood, Index Testaceologicus, Suppl., p. 11, pl. 3, fig. 25b (no locality given).
 1836 *Tiara foraminata* Broderip, Proc. Zool. Soc. London, pt. 3, p. 194 (St. Elena; Isle Plata; Panama).
 1838 *Mitra dupontii* Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 43, pl. 13, fig. 39 (Red Sea = error!) [spelled *dupontiae* by Kiener, 1839, p. 117].
 1844 *Mitra lens* Wood, Reeve, Conchologia Iconica, vol. 2, pl. 1, fig. 1; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 3, fig. 28; 1894 Stearns, Proc. U.S. Nat. Museum, vol. 17, p. 177; 1909 Dall, Proc. U.S. Nat. Museum, vol. 37, pp. 212, 286; 1947 Miller, Min. Conch. Club Sth. California, no. 68, p. 14; 1953 Rivera, Min. Conch. Club Southern California, no. 129, pp. 12, 14; 1967 Dushane & Poorman, Veliger, vol. 9, p. 432; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 12, textfig. 35 (radula).
 1844 *Mitra lignaria* Reeve, Conchologia Iconica, vol. 2, pl. 9, fig. 64 (St. Elena, W. Colombia = Ecuador); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 11, fig. 174.
 1882 *Mitra (Scabricola) lens* Wood, Tryon (*pars*), Manual of Conchology, vol. 4, p. 133, pl. 38, figs. 133, 137 and pl. 39, fig. 141 only; 1958 Keen, Sea shells trop. W. America, p. 428, fig. 647.
 1939 *Mitra cf. lens* Wood, Hertlein & Strong, Proc. California Acad. Sci., ser. 4, vol. 23, no. 24, p. 370.
 1958 *Mitra (Scabricola) lignaria* Reeve, Keen, Sea Shells Trop. W. America, p. 428, fig. 648.
 1971 *Mitra (Strigatella) lens* Wood, Keen, Sea Shells Trop. W. America, ed. 2, p. 640, fig. 1426 (figured syntypes of *M. foraminata* Broderip).
 1971 *Mitra lignaria* Reeve, Keen, *ibid.*, p. 642, fig. 1430 (figured holotype).

Types—The type-specimen of *M. lens* (Wood), which used to be in Mawe's collection, can no longer be traced. The 3 syntypes of *M. foraminata* (Broderip) are in the British Museum (NH) no. 1966421-423; the syntype which most closely corresponds to Broderip's given dimensions, length 64.0 mm, B.M. (NH) no. 1966421, is here selected as the lectotype of *M. foraminata*. Three syntypes of *M. dupontii* Kiener are in the Muséum d'Histoire Naturelle, Geneva, and the 35.0 mm long specimen, mounted on the left hand side of the tablet, is selected as the lectotype. The holotype of *M. lignaria* Reeve, is in the British Museum (NH) no. 1967798. No locality was given by Wood, but Broderip cited 3 localities for his *M. foraminata*, and his first locality, i.e. Santa Elena, Ecuador, is designated as the type locality of *M. lens* Wood.

Nomenclature—We agree with Tryon's (1882) and Dall's (1909) conclusion, that *M. lignaria* is a very worn *M. lens* with obsolete pittings. Keen (1971) not only lists *M. lignaria* as a valid species but places this species and *M. lens* in different subgenera. The absence or presence of a pitted spiral sculpture within the same species, has al-

ready been documented in Indo-Pacific Mitridae (see illustrations of *M. stictica*), and is a variable feature in Mitridae.

Records—BAJA CALIFORNIA: Magdalena Bay (USNM); Mulége Bay (Stearns, 1894); La Paz (Carpenter, 1857). MEXICO: Puerto Peñasco, Sonora (Eker coll.); Bachochibampo Bay, Sonora (AMNH); Nayarit (DMNH); Guaymas, Sonora (Cernohorsky coll.); Mazatlán (Powell coll.); Maria Madre I., Tres Marias Ids. (AMNH); Acapulco (USNM). EL SALVADOR: Acajutla (USNM). NICARAGUA: Corinto (AMNH); San Juan del Sur (USNM; AMNH). COSTA RICA: west coast (USNM); Tambor (Miller, 1947); Cocos Island (USNM). PANAMA: Taboga Island (USNM; ZMC); Kobbe beach (AMNH); Venado Island (USNM); Panama City (Powell coll.); Panama Canal zone (Cernohorsky coll.); San José I.; Pearl Ids. (USNM); Pedro Gonzales I., Pearl Ids. (USNM); Vera Cruz (AMNH). GALAPAGOS ISLANDS: (AMNH); Academy Bay, Santa Cruz I. (AMNH). ECUADOR: Between Manglaralto and Manta (USNM); Jaramijo (DMNH); Santa Elena (BMNH; AMNH). PERU: (USNM).

Fossil records—PLEISTOCENE: Raised beach, 5-10 m above sea level at James Bay, James Island, Galápagos I. (Hertlein & Strong, 1939); San Lorenzo Field and Santa Paula Field, Santa Elena Peninsula, Tablazo formation, Province Guayas, Ecuador (Rivera, 1953).

***Mitra muricata* (Broderip, 1836)** (Pl. 404)

Range—South Mexico to Ecuador.

Remarks—This uncommon species is closely related to the Caribbean *M. nodulosa* (Gmelin) and the west American *M. inca* d'Orbigny. It also resembles *M. lens* (Wood) but is smaller, rarely exceeding 36 mm in length and with mature specimens as small as 7.5 mm, it lacks the coarse sculpture of *M. lens* and is more slender and shouldered at the whorls and the overall sculpture is decidedly nodulose; the aperture is less broad than in *M. lens* and the outer lip is more or less parallel to the columella. Keen (1971) reports the species from the Galápagos Islands, but the specimens we have seen from that locality were the related species *M. gausapata* Reeve. The type locality "Galápagos Islands" is somewhat suspect, since the original label accompanying the type-specimens of *M. muricata* reads "California".

Habitat—Under rocks, within the intertidal region and in sandy mud to a depth of 6 fathoms.

Description—Shell up to 36 mm (about 1½ inches) in length, elongate-ovate, solid, sutures distinct and adressed. Whorls 6-7½, apart from an eroded protoconch, spire whorls angulate at the shoulder and with a narrow, sloping pre-sutural ramp, sculptured with slender axial riblets which number from 12-16 on the last 2 whorls; spiral cords encircle the shell and cut the axial

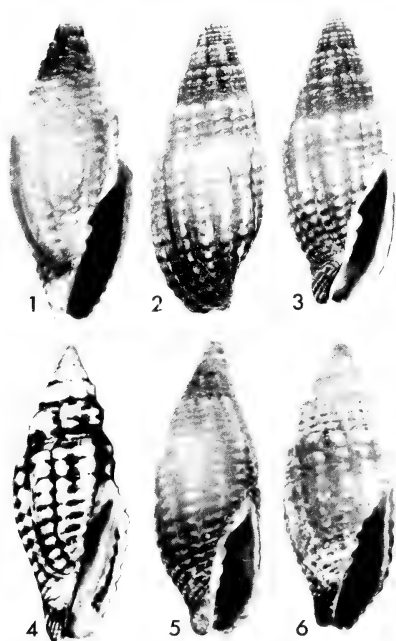


Plate 404. *Mitra (Nebularia) muricata* (Broderip).

Fig. 1. Lectotype from the "Galapagos Islands" or "California" (BM (NH) 1967810; 29.0 x 11.8 mm).

Figs. 2, 3. Specimen from Panama (USNM 707240; 27.0 x 10.2 mm).

Fig. 4. Lectotype of *M. rupicola* Reeve from St. Elena, Ecuador (BM (NH) 1964460; 36.5 x 14.6 mm).

Fig. 5. Holotype of *M. echyra* Melvill (BM (NH) 1965583; 20.4 x 7.5 mm).

Fig. 6. Holotype of *M. marshalli* Bartsch from Taboga Id., Panama (USNM 368135; 14.0 x 5.5 mm).

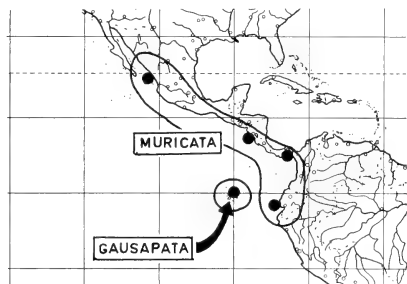


Plate 405. Geographical distribution of the species *Mitra (Nebularia) muricata* (Broderip), and *M. (N.) gausapata* Reeve.

ribblets into 3-4 spiral rows of small rounded nodules on the penultimate and 11-15 rows on the body whorl, in addition to 4-6 oblique and close-set cords on the siphonal fasciole. Under magnification very fine longitudinal hair-lines are discernible. Aperture slightly longer or shorter than the spire, narrow and smooth within, outer lip moderately thickened, almost parallel to the columella and feebly undulate at the margin; columella calloused, callus more prominent anteriorly, and with 3 or 4 strong, oblique folds, siphonal fasciole short and calloused, siphonal notch distinct. Cream to light brown under a dark brown, opaque periostracum, aperture and columella creamy-grey to brownish-grey.

Measurements (mm)—

length	width	height of aperture	
36.5	14.6	20.6	Lectotype of <i>rupicola</i>
29.0	11.8	15.2	Lectotype of <i>muricata</i>
27.0	10.2	14.1	Panama
15.4	5.3	7.0	Taboga I., Panama
14.0	5.5	7.7	Holotype of <i>marshalli</i>

Synonymy—

1836 *Tiara muricata* Broderip, Proc. Zool. Soc. London, pt. 3, p. 194 (Galapagos Islands).

1844 *Mitra rupicola* Reeve, Conchologia Iconica, vol. 2, pl. 8, fig. 53 (St. Elena, W. Colombia = Ecuador); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 8, pl. 11, fig. 169; 1971 Keen, Sea shells trop. W. America, ed. 2, p. 642, fig. 1433 (figured syntypes).

1845 *Mitra muricata* Reeve, Conchologia Iconica, vol. 2, pl. 31, fig. 253; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 25, fig. 558; 1971 Keen, Sea Shells Trop. W. America, ed. 2, p. 642, fig. 1432 (figured syntypes).

1882 *Mitra (Scabricola) lens (pars)* Wood, Tryon, Manual of Conchology, vol. 4, p. 133, pl. 39, figs. 142, 144 only (non *Voluta lens* Wood, 1828).

1925 *Mitra (Chrysame) echyra* Melvill, Proc. Malac. Soc. London, vol. 16, pt. 5, p. 217, pl. 10, fig. 9 (no locality given).

1931 *Mitra (Scabricola) marshalli* Bartsch, Proc. U.S. Nat. Museum, vol. 79, p. 4, pl. 1, fig. 4 (Taboga Island, Panama); 1958 Keen, Sea Shells Trop. W. America, p. 428 fig. 649.

1958 *Mitra (Scabricola) muricata* Broderip, Keen, Sea Shells Trop. W. America, p. 428, fig. 650.

1958 *Mitra (Scabricola) rupicola* Reeve, Keen, *ibid.*, p. 428, fig. 651.

1971 *Mitra marshalli* Bartsch, Keen, Sea shells trop. W. America, ed. 2, p. 642, fig. 1431.

Types—Three syntypes of *M. muricata* (Broderip), are in the British Museum (NH) no. 1967810, and the largest and most mature syntype, length 29.0 mm, is here selected as the lectotype. Four syntypes of *M. rupicola* Reeve, are in the same Institution B.M. (NH) no. 1964460. The largest, 37.5 mm long syntype, has broad axial folds with thin overriding spiral threads, and does not correspond to Reeve's description of a decussated, nodulose sculpture. Reeve obviously described the sculpture of the slightly smaller, i.e.

36.5 mm long specimen, and probably illustrated the larger syntype. We select the specimen which corresponds to his description (length 36.5 mm), as the lectotype of *M. rupicola*. The holotype of *M. marshalli* Bartsch, is in the National Museum of Natural History, Washington, no. 368135. The tentative type locality for *M. muricata* is Galápagos Islands, in 6 fathoms.

Nomenclature—Keen (1971) separates *M. muricata* from *M. marshalli* on the single feature of a more slender spire in *M. muricata*. One of Broderip's syntypes of *M. muricata* has a considerably broader spire than the holotype of *marshalli*, while the lectotype of *M. muricata* has a spire of about the same width as *M. marshalli*. There is no single, constant feature which would aid in the separation of the two species. *Mitra echyra* Melvill, described from unknown locality, is only tentatively placed in the synonymy of *M. muricata*. Although closely similar to *M. muricata*, the penultimate whorl has 5 spiral rows of nodules with a sixth row partially obscured by the body whorl suture. We have not seen any specimens of *M. muricata* with more than 4 spiral rows of nodules on the penultimate whorl.

Records—MEXICO: Mazatlán (ANSP). NICARAGUA: San Juan del Sur (USNM). PANAMA: west coast (USNM); Panama (ANSP); Taboga Island (USNM; ZMC). ECUADOR: Santa Elena (BMNH).



Plate 406. *Mitra (Nebularia) gausapata* Reeve. Galápagos Islands (Clover coll.; 26.8 x 10.5 mm).

Mitra gausapata Reeve, 1845

(Pl. 406)

Range—Galápagos Islands.

Remarks—The species resembles both *M. lens* (Wood) and to a lesser extent *M. muricata* (Broderip), but the sculpture is very coarse, and the spiral sculpture is very prominent on the lower half of the body whorl. The species appears to be endemic to the Galápagos Islands. The original description was based on a very small, juvenile specimen.

Habitat—Sublittoral, to a depth of about 10 fathoms.

Description—Shell up to 30 mm (about 1¼ inches) in length, elongate-ovate, solid, sutures distinct, adpressed and irregular. Whorls 5-7, apart from a protoconch of 3½ smooth, orange-fawn nuclear whorls, spiral whorls subangulate and with a sloping presutural ramp, sculptured with rude and moderately broad axial ribs which number from 10-12 on the last 2 whorls; the presutural ramp has 3-4 deep grooves which give rise to the same number of spiral cords, and the axial ribs are generally more prominent on the dark coloured part of the shell. On the body whorl the axial ribs generally cease at about one-third the distance anteriorly to the suture, and are followed by heavy, coarsely nodulose spiral cords which extend to the base; spiral cords number about 4 on the penultimate whorl where they override the axial ribs, and about 15-16 on the body whorl. Aperture about equal in height or slightly longer than the spire, moderately narrow and smooth within, outer lip angulate, particularly near the start of the outer lip, and simple or slightly undulate at the margin. Columella calloused, callus weak on the parietal wall, and with 4-5 close-set, oblique folds; siphonal fasciole straight and prominently corded, siphonal notch distinct. Dark brown, blackish brown or dark greenish brown in colour, presutural ramp with a yellowish or white transverse band, grooves between cords within the pale zone usually lined with dark brown; aperture and columella bluish grey, parietal wall brown.

Measurements (mm)—

length	width	height of aperture	
26.7	10.6	13.7	Galápagos Islands
11.8	5.3	6.6	Lectotype of <i>gausapata</i>
10.8	5.0	6.2	Syntype of <i>gausapata</i>

Synonymy—

1845 *Mitra gausapata* Reeve, *Conchologia Iconica*, vol. 2, pl.

38, fig. 317 (Galápagos Islands, 10 fathoms); 1857 Carpenter, Rept. Brit. Assoc. Adv. Science, for 1856, pp. 186, 339; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 24, pl. 25, fig. 559.

1882 *Mitra ficulina* (pars) Lamarck, Tryon, Manual Conchology, vol. 4, p. 190, pl. 56, fig. 614 only (non Lamarck, 1811).

1971 *Mitra* (*Strigatella*) *gausapata* Reeve, Keen, Sea shells of trop. W. America, ed. 2, p. 640, fig. 1424.

Types—The 2 juvenile syntypes of *M. gausapata* are in the British Museum (NH) no. 1967769, and the larger, 11.8 mm long specimen, is here selected as the lectotype. The type locality is Galápagos Islands, in 10 fathoms.

Records—All specimens examined were labelled only "Galápagos Islands."

Mitra inca Orbigny, 1841

(Pl. 407)

Range—Mexico to Peru

Remarks—The species appears to be very rare, and we have seen no reliably documented specimens in museums. The species is very closely related to the Caribbean *M. nodulosa* (Gmelin) and appear to be inseparable on shell-characters. Carpenter (1864) commented that *M. nucleola* "closely resembles young specimens of the Caribbean *M. granulosa* (= *nodulosa* Gmelin)". Both C. B. Adams (1852) and Carpenter (1856; 1864) utilized Lamarck's name *M. nucleola* for the West Panamanian species, and the writer (1969) considered it to be an earlier name for *M. inca* Orbigny, as the two type-specimens are very similar, if not inseparable. Keen (1971), however, considers *M. nucleola* to belong to the Caribbean "*M. barbadensis* (Gmelin)", a species which bears no

resemblance to either *M. nucleola* Lamarck or *M. inca* Orbigny; a comparison of *M. nucleola* with the Caribbean *M. nodulosa* would have been more appropriate. Since stability of nomenclature is involved, and giving due regard to the unknown origin of the syntypes of *M. nucleola* which resemble both *M. inca* and *M. nodulosa*, we concede that *M. nucleola* could be regarded as a dubious name and adopt the well-localized *M. inca* instead. Further collections of living specimens of *M. inca* and biological comparison with its Caribbean analogue *M. nodulosa*, may necessitate a reduction of *M. inca* to subspecific rank. Detailed comparisons with the west American *M. muricata* are also imperative. The outstanding feature of *M. inca* is the finely nodulose sculpture, which consists of slender axial riblets which are divided into small nodules by spiral grooves.

Habitat—According to Dushane and Poorman (1967), the species lives on a rock and gravel bottom, at depth of 10 fathoms.

Measurements (mm)—

length	width	height of aperture	
29.0	12.8	15.3	Holotype of <i>inca</i>

Synonymy—

?1811 *Mitra nucleola* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 218 (no locality given); 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 984, pl. 6, fig. 46 (figured lectotype) [dubious name].

1841 *Mitra inca* d'Orbigny, Voy. L'Amérique Méridionale, Mollusques, vol. 5, pt. 3, p. 427, pl. 77, fig. 1 (near Payta, coasts of Peru); 1966 Keen, Veliger, vol. 9, p. 4, pl. 1, fig. 17 (figured holotype); 1967 Dushane & Poorman, Veliger, vol. 9, p. 432.

1857 *Mitra nucleola* Lamarck, Carpenter, Rept. Brit. Assoc. Adv. Science, for 1856, pp. 267, 338; 1864, Proc. Zool. Soc. London, for 1863, p. 341; 1864, Rept. Brit. Assoc. Adv. Science, for 1863, p. 538 (? non *M. nucleola* Lamarck, 1811).

1971 *Mitra* (*Strigatella*) *inca* d'Orbigny, Keen, Sea Shells Trop. W. America, ed. 2, p. 640, fig. 1425 (figured holotype).

Types—The juvenile holotype of *M. inca* is in the British Museum (NH) no. 1854.12.4.434. The type locality is near Paita, Peru.

Records—MEXICO: Guaymas, 10 faths. (Dushane & Poorman, 1967); PANAMA: (MCZ; C. B. Adams, 1852; Carpenter, 1864). PERU: Paita (BMNH).

Mitra belcheri Hinds, 1844

(Pl. 408)

Range—Gulf of California, Mexico to Panama.

Remarks—The species is moderately rare and locality records are meager. Although not reported further south than Panama, an occurrence in Ecuador and Peru is probable.



Plate 407. *Mitra* (*Nebularia*) *inca* d'Orbigny. Holotype from near Paita, Peru (BM (NH) 1854.12.4.434; 29.0 x 12.8 mm) [from Keen, 1966, pl. 1, fig. 17].

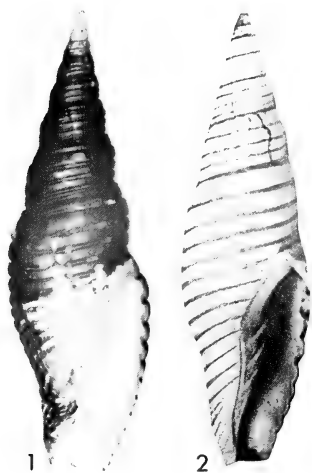


Plate 408. *Mitra (Nebularia) belcheri* Hinds.

Fig. 1. Syntype from the Gulf of Nicoya, Costa Rica (BM (NH) 1967934; 74.0 x 22.8 mm).

Fig. 2. Holotype of *M. cyclica* Olsson from Quebrada Penitas, Charco Azul formation, Pliocene of Costa Rica (from Olsson, 1942, pl. 7, fig. 1; 50.0 x 16.0 mm).

Habitat—Sublittoral, to a depth of 50 fathoms.

Description—Shell up to 130 mm (about 5 inches) in length, elongate-ovate, heavy and solid, sutures very narrowly canaliculate. Whorls 9-11 apart from the protoconch, spire whorls convex and occasionally weakly shouldered on the pre-sutural ramp. First 6 post-nuclear whorls with flat or slightly rounded spiral cords and distinct axial lirations which become obsolete on the later whorls and are substituted by numerous, macroscopic longitudinal hair-lines; the spiral grooves are narrow and deep, smooth on the last 2-4 whorls, and produce broad and flat spiral cords which number from 5-6 on the penultimate and from 11-14 on the body whorl. Juvenile specimens have usually more numerous spiral cords on the body whorl. Aperture shorter than the spire, moderately narrow and smooth within; outer lip only moderately thickened and scalloped at the margin, columella calloused and angulate and with 4-5 well-spaced, oblique folds in adults and 3 folds in immature specimens. Siphonal fasciole thickened and twisted, siphonal notch distinct. White to cream in colour, occasionally flushed with yellowish-brown and covered by a black

periostracum; aperture and columella cream in colour.

Measurements (mm)—

length	width	height of aperture	
129.0	35.0	60.0	Morro Colorado, Mexico
114.5	32.0	51.5	Guaymas, Mexico
106.4	31.0	50.6	off Mazatlan, Mexico
106.4	29.2	47.8	Probable syntype of <i>belcheri</i>
74.0	22.8	35.8	Probable syntype of <i>belcheri</i>
50.0	16.0	—	Holotype of <i>cyclica</i>

Synonymy—

- 1843 *Mitra belcheri* Hinds, *Annals & Mag. Nat. History for* 1843, vol. 11, p. 255 (Gulfs of Nicoya and Papagayo, Central America, 17 fathoms); 1844, *Zoology voyage H.M.S. Sulphur*, Mollusca, pt. 2, p. 40, pl. 11, figs. 1, 2; 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 14, fig. 93; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 3, pl. 6, fig. 80; 1882 Tryon, *Manual of Conchology*, vol. 4, p. 139, pl. 40, fig. 181; 1947 Miller, *Minutes Conch. Club Southern California*, no. 68, p. 14; 1953 Burch, *ibid.*, no. 126, p. 3; 1966 Keen, *Veliger*, vol. 8, p. 270; 1967 J. Cate, *Veliger*, vol. 10, p. 193, fig. 2 (shell), textfig. 2 (radula); 1970 Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 12, fig. 33 (radula).
1942 *Mitra cyclica* Olsson, *Bull. Americ. Paleontology*, vol. 27, no. 106, p. 64, pl. 7, fig. 1 (Pliocene of Costa Rica).
1958 *Mitra* (? *Strigatella*) *belcheri* Hinds, Keen, *Sea shells trop. W. America*, p. 429, fig. 652.

Types—Keen (1966) could not locate the types, but when the writer visited the British Museum (NH) in 1968, there were 3 specimens segregated as syntypes, B.M. (NH) no. 1967934. Hinds' description of the species was based on an adult and a juvenile specimen, and the length given by Hinds was 48 lines (= 101.6 mm). The probable syntype series consists of one juvenile 74.0 mm in length, 1 adult 106.4 mm in length (probably the specimen Hinds gave dimensions for) and a larger adult 111.5 mm in length, which may have been added at a later date. The holotype of *M. cyclica* Olsson, is in the Paleontological Research Institution, Ithaca, no. 4048. The type locality is Gulf of Nicoya and Gulf of Papagayo, Central America, 17 fathoms, and we designate the first-named locality, i.e. Gulf of Nicoya, Costa Rica, as the type locality.

Nomenclature—Olsson's description of his *M. cyclica*, i.e. the deeply grooved sutures, axial lirae on spire whorls, flat cords, scalloped outer lip etc., all agree with characters present in the Recent *M. belcheri*. Olsson pointed out that the fossil species has only 4 spiral cords on the penultimate whorl, but in a recent specimen of *M. belcheri*, the 5th cord was already partly submerged in the body whorl suture.

Records—BAJA CALIFORNIA: off La Paz (Burch, 1953). MEXICO: S. of Empalme, El Cocho beach, Sonora (USNM); Guaymas, Sonora (Powell coll.), Morro Colorado, Sonora

(DMNH); off Guaymas, Senora, 30 faths. (Cernohorsky coll.); Mazatlan (DMNH; USNM); off Mazatlan, 50 faths. (Cernohorsky coll.). COSTA RICA: Tambor (Miller, 1947). PANAMA: Taboga Island (USNM).

Fossil records—PLIOCENE: Quebrada Penitas, Puntarenas Province, Charco Azul formation, Costa Rica (type-locality of *M. cyclica* Olsson).

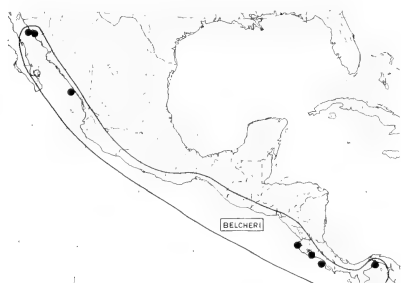


Plate 409. Geographical distribution of *Mitra (Nebularia) belcheri* Hinds.

Mitra yasila Olsson, 1930

(Pl. 410)

Range—Upper Eocene of Peru.

Remarks—The species is similar to *M. belcheri* and may be the ancestral form of the species. The Eocene *M. yasila* is smaller, but has the same deep grooves and low, elevated flat cords; the



Plate 410. *Mitra (Nebularia) yasila* Olsson. Holotype and paratype from Yasila, Talara formation, U. Eocene of Nth. Peru (from Olsson, 1930, pl. 10, figs. 1, 2; fig. 1 = holotype, 25.0 x 8.2 mm; fig. 2 = paratype, 19.0 x 6.7 mm).

grooves are more distinctly lirate on the later whorls than in *M. belcheri* which has interstitial lirae on the spire whorls. The penultimate whorl has 4-5 cords, the body whorl up to 22 or more and the columella has 3 folds. The figured holotype and paratype appear to be young specimens.

Measurements (mm)—

length	width	height of aperture	
37.0	—	—	Paratype of <i>yasila</i>
25.0	8.25	13.0	Holotype of <i>yasila</i>
19.0	6.75	11.5	Paratype of <i>yasila</i>

Synonymy—

1930 *Mitra (Tiara) yasila* Olsson, Bull. Amer. Paleontology, vol. 17, no. 62, p. 43, pl. 10, figs. 1, 2 (*Yasila*, Department of Piura, Talara formation, N. Peru, U. Eocene; holotype in the Paleontological Research Institution, Ithaca, no. 24252).

Mitra effusa Broderip, 1836

(Pl. 411, figs. 1, 2)

Range—Gulf of California to Clipperton Island, Galápagos Islands and Panama.

Remarks—This is the western Pacific analogue of the Caribbean *M. barbadensis* (Gmelin); some individuals from the Caribbean and West America are so closely similar that a subspecific separation of *effusa* and *barbadensis* may after all, be taxonomically more correct. *M. effusa* only superficially resembles species of the *Cancilla* group, but the sculpture of spiral threads is of a different origin and only incidental as in many other *Mitra* s. str. species. The radula of *M. effusa* is as yet unknown, but the radula of the closely related *M. barbadensis* is typically mitrine. Keen's allocation of *M. effusa* in the subgenus *Isara* H. & A. Adams, is not appropriate, since the type of the genus is a synonym of the S.E. Australian *M. glabra* Swainson, a group of species not at all related to the west American *effusa*, and lacking the spiral threads of that species.

Habitat—Intertidal, under stones and in sand and mud, to a depth of 17 fathoms.

Description—Shell up to 35 mm (about 1½ inches) in length, fusiformly-elongate and only moderately solid, light in weight, sutures distinct. Whorls 6-7 apart from the protoconch, spire whorls regularly convex, sculptured with numerous and close-set primary spiral threads and smaller, finer intermediate spirals in groups of 1-3. The spiral threads on the penultimate whorl number up to 20 (10 primary + 10 intermediate threads) and on the body whorl up to 60 (up to 25

primary + 35 intermediate threads); the interstices have very faint, macroscopic axial striae which tend to become obsolete in some specimens. Aperture moderately narrow but widening anteriorly, shorter or slightly longer than the spire, smooth within; the outer lip descends almost vertically and is moderately thickened and finely crenulate at the margin. Columella caloused and with 4 or 5 oblique cords, siphonal fasciole straight, siphonal notch distinct. Light brown to dark brown in colour under a chestnut-brown periostracum, aperture and columella white or bluish-white.

Measurements (mm)—

length	width	height of aperture	
33.0	9.5	14.4	Academy Bay, Galápagos
31.6	9.5	15.0	Lectotype of <i>effusa</i>
26.0	8.0	13.0	Panama
21.2	7.0	11.0	Panama

Synonymy—

1836 *Mitra effusa* Broderip, Proc. Zool. Soc. London, pt. 3, p. 94 (Guacomayo, Central America and Galapagos Islands); 1844 Conchologia Iconica, vol. 2, pl. 14, fig. 100; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 8, fig. 104; 1882 Tryon, Manual Conchology, vol. 4, p. 127, pl. 37, fig. 109; 1909 Dall, Proc. U.S. Nat. Museum, vol. 37, p. 212, 1960 Hertlein & Allison, Veliger, vol. 3, p. 14.

1958 *Mitra (Tiara) effusa* Broderip, Keen, Sea shells trop. W. America, p. 430, fig. 658.

1971 *Mitra (Isara) effusa* Broderip, Keen, *ibid.*, ed. 2, p. 640, fig. 1422 on left and fig. 1422 on right (figured "holotype" = lectotype).

Types—The 3 syntypes of *M. effusa* are in the British Museum (NH) no. 1966415. Broderip did not designate a holotype in the original publication nor did he segregate a holotype from his 3 syntypes. We therefore designate the largest

specimen which closely corresponds to Broderip's cited dimensions, length 31.6 mm, width 9.5 mm, as the lectotype of *M. effusa*; this lectotype has been figured by Keen (1971) as the "holotype" of *M. effusa*. The given localities were Guacomayo, and Galápagos Islands, and the first-named locality, i.e. Guacomayo, S. Mexico, is designated as the type locality.

Records—MEXICO: Mulege Bay, Baja California (USNM); Barre de Navidad, Jalisco (Eker coll.). CLIPPERTON ISLAND: (Hertlein & Allison, 1960). PANAMA: (DMNH; Clover coll.; Eker coll.); Taboga Island (ZMC). COCOS ISLAND: (AMNH). GALÁPAGOS ISLANDS: Academy Bay, Santa Cruz I. (USNM; AMNH); James Island (USNM).

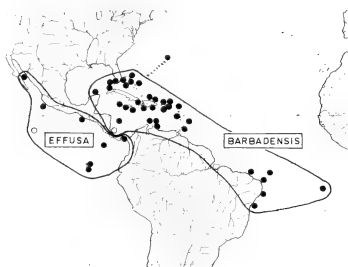


Plate 410a. Geographical distribution of the species *Mitra (Nebularia) effusa* Broderip, and *M. (N.) barbadensis* (Gmelin).

Caribbean species

Mitra barbadensis (Gmelin, 1791)

(Color pl. 257, figs. 28, 29; pl. 411, figs. 3-6)

Range—Southern Florida to the east coast of central America, northern Brazil and Ascension Island; Bermuda.

Remarks—The species is very closely related to the west American *M. effusa*, and the two species differ primarily in colour; the white flakes in *M. barbadensis* do not appear in the colour-pattern of *M. effusa*. The species will reach a length of 43.0 mm (about 1½ inches), and slender and broad forms occur throughout the species range; the interspaces of the main spiral threads have up to 3 intermediate spirals, but in some individuals the spiral sculpture becomes obsolete on the last 1-3 whorls. The numerous, longitudinal hair-lines are usually always distinct, at least as far as the penultimate whorl. The outer lip is minutely and bluntly crenulate and the columella has 5 or 6 close-set, oblique folds, which are white and decrease in size towards the anterior. The shell is yellowish-brown to dark brown, ornamented with white flakes, spots or small blotches. In some specimens from North Brazil, the white flakes are almost absent, and the shell is broad and has a strigatelliform appearance. Tomlin (1923) reported the species from São Thomé Island, some 170 miles west of Gabon, West Africa, but its occurrence near the West African coast remains doubtful.

Measurements (mm)—

length	width	height of aperture	
42.4	12.6	19.5	Lectotype of <i>striatula</i>
34.0	12.6	18.0	Fortaleza, N. Brazil
23.6	8.0	13.4	Tobago I., Antilles
22.4	8.4	12.5	Cuba

Synonymy—

1791 *Voluta barbadensis* Gmelin, Systema Naturae, ed. 13, p. 3455 (refers to Lister, Conchology, pl. 819, fig. 33) [American Ocean]; 1817 Dillwyn, Descr. Cat. Recent shells, vol. 1, p. 541; 1825 Wood, Index Testaceologicus, p. 96, pl. 20, fig. 93a (Barbados).

1804 *Voluta striatula* Schröter, Arch. Zool. & Zootomie, vol. 4, pt. 1, p. 37 (no locality given).

1811 *Mitra striatula* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 210 (probably coasts of Africa = error!); 1822, Anim. s. vertébrés, vol. 7, p. 312 (American Ocean); 1838 Kiener, Spécies générale iconographie coquilles vivantes, vol. 3, p. 36, pl. 13, fig. 41; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 13, fig. 96; 1851 Beau, Journal de Conchyliologie,

vol. 2, p. 429; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 8, fig. 97 and pl. 9, fig. 374; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 971, pl. 4, fig. 26 (figured lectotype).

1817 *Murex zebrula* Dillwyn, Descr. cat. Recent shells, vol. 1, p. 541 (in synonymy of *Voluta barbadensis* Gmelin).

1874 *Mitra barbadensis* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 5, pl. 13, fig. 204; 1882 Tryon, Manual of Conchology, vol. 4, p. 118, pl. 35, figs. 45, 46; 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, p. 340; 1961 Warmke & Abbott, Caribbean Seashells, p. 124, pl. 22, fig. 10; 1968 Houbbrick, Veliger, vol. 11, p. 17; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 12, fig. 34 (radula); 1970 Rios, Coastal Brazilian Seashells, p. 105, pl. 33, 2 figs.

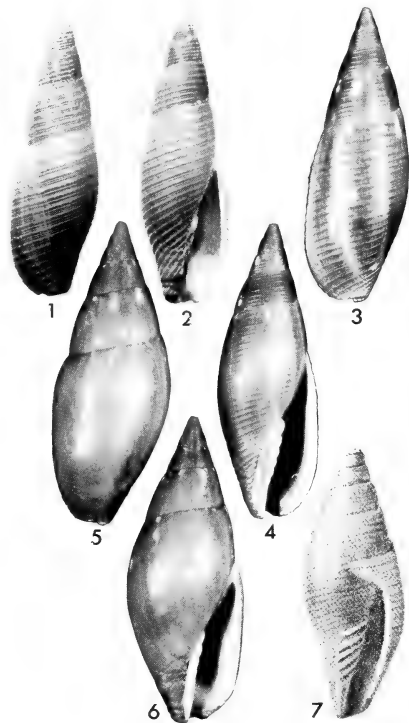


Plate 411. Figs. 1, 2. *Mitra (Nebularia) effusa* Broderip Figs. 3-6. *M. (N.) barbadensis* (Gmelin) Fig. 7. *M. (N.) acteoglypha* Gardner.

Figs. 1, 2. Specimen of *M. (N.) effusa* Broderip from Panama (Clover coll.; 26.4 x 8.0 mm).

Figs. 3, 4. Specimen of *M. (N.) barbadensis* (Gmelin) from Bucoo reef, Tobago Id.; slender, sculptured form (WOC coll.; 23.6 x 8.0 mm).

Figs. 5, 6. Specimen of *M. (N.) barbadensis* (Gmelin) from Mucuripe, Fortaleza, Brazil; broad, smooth form (WOC coll.; 25.8 x 11.0 mm).

Fig. 7. Type figure of *M. (N.) acteoglypha* Gardner from Baileys Ferry, Chipola River, L. Miocene of Florida (from Gardner, 1937, pl. 48, fig. 5; 19.0 x 7.0 mm).

Types—The whereabouts of the types of *Voluta barbadensis* Gmelin, and *V. striatula* Schröter, are unknown. The lectotype of *Mitra striatula* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/64/1. Barbados Island, Antilles, is here designated as the type locality of *M. barbadensis* (Gmelin).

Records—FLORIDA: Pelican shoals near Key West (USNM; Powell coll.); off Sambo reef, 50 faths. (USNM); Miami beach (DMNH; AMNH); Stock Island, Key West (DMNH; AMNH); TORTUGAS: (USNM); Sand Key (DMNH); BERMUDA: R. H. Jensen coll.; BAHAMA ISLANDS: Mintie Bar, South Bight, Andros I.; Cockburntown, San Salvador (both USNM); Cabbage beach, Hog I., opposite Nassau (USNM; Powell coll.); N.W. of Entrance Point, N. Bimini I.; East Point, New Providence I.; Lynyard Cay, Abaco (all AMNH); CUBA: Guantanamo Bay (USNM); Camaguey (DMNH); Mariano Habana (Powell coll.); GRAND CAYMAN ISLAND: (USNM; AMNH); YUCATAN: Mujeres Island, Quintana Roo (USNM); JAMAICA: Portland; Robins Bay, St. Mary (both USNM); HONDURAS: Roatan I. (DMNH); PROVIDENCE ISLAND (Colombia); Shoal (USNM); COSTA RICA: Portete (Houbrick, 1968); HAITI: Little reef, Petit Grove (USNM); DOMINICA: Calibishie (USNM); Barbahona (AMNH); PUERTO RICO: Guánica; Ensenada Honda, Culebra (both USNM); Caribe Hilton hotel, San Juan; beach at Magueys Island (both AMNH); VIRGIN ISLANDS: St. Thomas (USNM); St. Croix (USNM; AMNH); Hawk's Nest Bay, St. John (AMNH); LESSER ANTILLES: English Harbour, Antigua (USNM); Guadalupe (Beau, 1851); St. Vincent (AMNH); off the Castle, E. side of Barbados I., 1-4 faths.; Buccoo reef, Tobago (both USNM); Bonaire (DMNH); Curacao (Clover coll.); S. coast of Curacao; Boca Playa Canoa, Curacao; S. coast of Aruba I. (all AMNH). BRAZIL: off Macuripe, Fortaleza, Ceará, 12 fths., *ex-pisces* (R. Matthews coll.; DMNH; Cernohorsky coll.) off Rocas reef, Fernando de Noronha Island (R. Matthews coll.); off Cabo S. Roque, 21 faths. (Rios coll.); Ponta Verde, Maceio, Alagoas (Cardoso coll.); Itapua, Salvador, Bahia (Rios coll.). ASCENSION ISLANDS: Turtlesell Beach (DMNH).

Fossil records—U. MIOCENE: Santo Domingo, Dominican Republic (Pilsbry, 1922).

Mitra acteoglypha Gardner, 1937

(Pl. 411, fig. 7)

Range—Lower Miocene of Florida.

Remarks—The species appears to be related to the Recent *M. barbadensis* (Gmelin). The spire whorls are almost flat-sided, the sutures are deeply impressed and the sculpture consists of evenly developed, regularly punctate grooves which number about 7 on the antepenultimate, probably 10 on the penultimate and 28 on the body whorl. The intervening flat cords are twice as wide as the grooves, with the exception of the basal spiral threads. The aperture is longer than the spire, smooth within, the columella is not callosed and has 6 close-set, parallel folds which are similar in their arrangement to *M. barbadensis*.

Measurements (mm)—

length	width	height of aperture	
19.0	7.0	11.6	Holotype of <i>acteoglypha</i>

Synonymy—

1937 *Mitra acteoglypha* Gardner, U.S. Geol. Surv. Prof. Paper, no. 142F, p. 406, pl. 48, fig. 5 (1 mile below Baileys Ferry, Chipola River, Calhoun County, Florida, L. Miocene; holotype in USGS, National Museum of Natural History, Washington, no. 114328).

1970 *Mitra (Nebularia) acteoglypha* Gardner, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 68, pl. 2, fig. 10.

Mitra nodulosa (Gmelin, 1791)

(Color pl. 257, figs. 32-34; pl. 414)

Range—Florida to the east coast of central America and northern Brazil; Bermuda.

Remarks—A very variable and common species, which is either fusiformly-elongate or short and stunted, with an overall sculpture of small nodules usually arranged in the form of nodulose axial ribs. The recently described ecophenotypic variant *M. brasiliensis* Oliveira *et al.*, 1969, has fewer and consequently more widely-spaced, elevated axial riblets; the nodules are prominent on the spire whorls but are occasionally only feebly elevated on the last 2 whorls. We have seen similar sculptural forms from the Lesser Antilles and Florida.

Habitat—In tide pools, under rocks and on a sand and coral-rubble bottom, from the intertidal zone to a depth of 20 fathoms.

Description—Shell up to 47 mm (about 2 inches), in length, solid, fusiformly-elongate or elongate-ovate and somewhat cylindrical, sutures

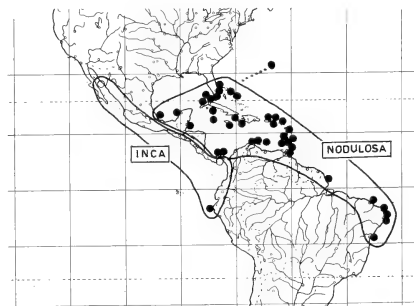


Plate 413. Geographical distribution of the species *Mitridae (Nebularia) inca* Orbigny, and *M. (N.) nodulosa* (Gmelin).

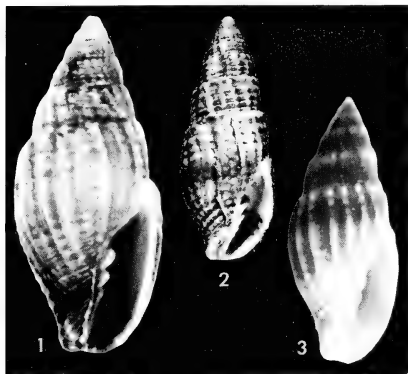
Plate 414. *Mitra (Nebularia) nodulosa* (Gmelin).

Fig. 1. Questionable holotype of *M. monilifera* C. B. Adams from Jamaica. (MCZ 186093; 19.3 x 8.5 mm).

Fig. 2. Lectotype of *M. granulosa* Lamarck (MHNG 1102/49; 45.4 x 17.1 mm).

Fig. 3. Holotype of *M. brasiliensis* Oliveira et al. from Salvador, Bahia, Brazil (Federal Univ. Juiz de Fora, 3244; 21.8 x 9.0 mm) [photo courtesy Prof. Oliveira].

distinct, adpressed, irregularly nodulose and narrowly ledged in some individuals. Whorls 7-9, apart from the protoconch which is eroded, spire whorls slightly convex, sculptured with nodulose, wide-spaced or close-set axial riblets which number from 10-22 on the penultimate and from 14-24 on the body whorl; shallow spiral grooves, which are frequently obsolete, produce spiral cords which form laterally oriented nodules upon the axial riblets, but the cords are often weak or even absent in the interspaces. The penultimate whorl has from 3-5 spiral cords and the body whorl from 10-13, apart from 5-10 smoother cords on the siphonal fasciole; numerous and fine longitudinal hair-lines cover the shell surface. Aperture shorter or slightly longer than the spire, moderately narrow and smooth within, outer lip moderately thickened and descending almost vertically and slightly angulate anteriorly, outer lip margin almost smooth or slightly undulate. Columella calloused and with 3-5 oblique folds, siphonal fasciole short, straight or slightly recurved and occasionally calloused, siphonal notch distinct. Orange-brown, reddish-brown to dark brown in colour, body whorl occasionally with 1-2 faint, darker brown transverse bands, sutures, sutural nodules and some axial riblets occasionally paler in colour; aperture and columellar folds brownish-grey, parietal wall usually flushed with brown. Periostracum thin, brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
45.4	17.1	19.9	Lectotype of <i>granulosa</i>
34.8	12.8	16.8	Barbados Island
29.4	11.0	13.8	Palm Beach, Florida
26.1	10.0	13.0	off Mucuripe, Brazil
22.6	9.0	12.0	Sambos, Florida
21.8	9.0	10.0	Holotype of <i>brasiliensis</i>
19.3	8.5	10.5	Holotype of <i>monilifera</i>
18.8	7.8	9.8	Fort Jefferson, Dry Tortugas
13.6	6.2	7.8	Palm Beach, Florida

Synonymy—

- 1780 "*Turricula reticulato-constricta*" Chemnitz, Syst. Conchylien-Cabinet, vol. 4, p. 226, pl. 149, figs. 1385, 1390 (non binomial).
- 1791 *Voluta nodulosa* Gmelin, Systema Naturae, ed. 13, p. 3453 (refers to Gualtieri, pl. 52, figs. F, G. = error); and Chemnitz, op. cit., figs. 1385, 1390 [no locality given]; 1817 Dillwyn, Descr. Cat. Recent shells, vol. 1, p. 544; 1825 Wood, Index Testaceologicus, p. 97, pl. 20, fig. 1004; 1967 Cernohorsky, Journal of Conchology, vol. 26, p. 166.
- 1811 *Mitra granulosa* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 201 (Océan des grandes Indes = error); 1838 Kiener, Spécies générale iconographie des coquilles vivantes, vol. 3, p. 25, pl. 8, fig. 22; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 9, fig. 62; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 8, fig. 90*; 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, p. 340; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 959, pl. 2, fig. 9 (figured lectotype).
- 1817 *Voluta litosa* Dillwyn, Descr. Cat. Recent shells, vol. 1, p. 544 (in synonymy of *V. nodulosa* Gmelin).
- 1824 *Mitra granulata* DeFrance in Blainville, Dict. Sci. Naturelles, vol. 31, p. 483 (refers to Tabl. Encycl. Méthodique, pl. 370, fig. 6) [Grandes Indes = error].
- 1852 *Mitra monilifera* C. B. Adams, Contrib. Conchology, no. 4, p. 57 (Jamaica); 1950 Clench & Turner, Occas. Papers Mollusca, vol. 1, no. 15, p. 310, pl. 36, fig. 9 (figured holotype).
- 1853 *Mitra nodulosa* Gmelin, Beau, Journal de Conchyliologie, vol. 4, p. 415; 1889 Dall, Bull. Mus. Comp. Zool. Harvard, vol. 18, p. 157; 1954 Abbott, American Seashells, p. 248, pl. 26, fig. b; 1961 Warmke & Abbott, Caribbean Seashells, p. 124, pl. 22, fig. j; 1970 Rios, Coastal Brazilian Seashells, p. 106, pl. 33, bottom row, fig. on left.
- 1959 *Mitra nodulosa pallida* Nowell-Usticke, Check-list mar. shells St. Croix, p. 76, pl. 4, fig. 6 (Ham Bay, St. Croix, Virgin Islands) [non *M. pallida* A. Adams, 1853].
- 1969 *Mitra brasiliensis* Oliveira, Almeida, Vieira, & Oliveira, Rev. Univ. Fed. Juiz de Fora, Suppl. vol. 5, no. 1, p. 3, fig. 1-3 (Salvador, Bahia, Brazil); 1970 Rios, Coastal Brazilian Seashells, p. 105, pl. 33, top row, fig. on right.
- 1970 *Mitra (Nebularia) nodulosa* (Gmelin), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 12, textfigs. 36, 37, 37a (radulae).

Types—Gmelin probably did not own a specimen of *M. nodulosa*, and on the basis of his references, the species consists of *Vexillum crocatum* (Lamarck) [the Gualtieri reference], and *M. nodulosa* of authors. Since the type-specimen is no longer traceable, we designate figure 1385 depicted on plate 149 in vol. 4 of Chemnitz, as the lectotype of *M. nodulosa* (Gmelin). The lectotype

of *M. granulosa* Lamarck, is in the Museum d'Histoire Naturelle, Geneva, no. 1102/49, and the holotype of *M. brasiliensis* Oliveira *et al.*, is in the Dept. of Malacology, Federal University of Juiz de Fora, Brazil no. 3244. The holotype of *M. monilifera* C. B. Adams, which is the species *M. nodulosa* as illustrated by Clench & Turner (1950), is in the Museum of Comparative Zoology, Harvard, no. 186093. C. B. Adams described his species as "brownish-black with a white spiral band . . . which is dilated into spots on the ribs; with rather acute longitudinal ribs, about fourteen on each whorl". This description, together with the colour indication (such ornamentation is unknown in *M. nodulosa* and absent in the holotype of *M. monilifera*), and the author's comparison of his species with vexilline species like *M. microzonias* Lamarck, and *M. leucodesma* Reeve, raise some doubts about the existing "holotype" being actually the type of *M. monilifera*. The holotype hardly resembles the vexilline species alluded to by C. B. Adams, and also has 22 axial ribs on the penultimate and 18 on the body whorl, which disagrees with the 14 ribs on the last two whorls as given by Adams. Gmelin did not give a locality, but Chemnitz reported the species from St. Croix, and St. Croix, Virgin Islands, is here designated as the type locality. Lamarck's indication of Indian Ocean and Kiener's "New Zealand" are both erroneous.

Records—FLORIDA: Lone Key reef (USNM); Boynton Beach, outer reef, Key Largo, off Fort Lauderdale, 4 faths. (all AMNH); Hillsborough reef, N. of Pompano (AIM); Fort Jefferson, Dry Tortugas (Powell coll.); Palm Beach Inlet, Lake Worth (AIM; Powell coll.); Palm Beach (Clover coll.); Long reef, Florida Keys; Sambos, off Geiger Key (both Cernohorsky coll.). BERMUDA: R. Jensen, coll. BAHAMA ISLANDS: Bimini Island (USNM; AMNH); Cockburntown, San Salvador (USNM); Bimini lagoon, Bimini I.; East Point, New Providence I. (both AMNH); Berry Island (AIM). CUBA: Ensenada de Cochinos; Bahia Honda, 1-12 faths.; Varadero (all USNM); Windmill Beach, Guantanamo Bay; Playa Rancho Lunas, Cienfuegos, Las Villas (both AMNH). GRAND CAYMAN ISLAND: (USNM); reef N.E. Channel, Gun Bay (USNM); Seven mile Beach (AMNH). E. COAST OF MEXICO: San Miguel, Cozumel (USNM); Veracruz (Powell coll.). YUCATAN: Campeche Bay (USNM). HONDURAS: Oak ridge, Roatan I. (MCZ). E. COAST OF PANAMA: Colón, Galeta Point; N.W. end of Payardi Island (all USNM). JAMAICA: Kingston; Robins Bay, St. Mary (both USNM); Grand Cayman I. (DMNH). HAITI: Torbeck (USNM). PUERTO RICO: Aguadilla; San Juan (both USNM); 10 mi. E. of San Juan (AMNH). VIRGIN ISLANDS: St. Thomas (USNM); Grassy Point, St. Croix (DMNH; AMNH); 2 km S. from Sandy Point, St. Croix, 9 m (ZMC). LESSER ANTILLES: English Harbour, Antigua; Swan Island, W. of Portsmouth, Dominica (all USNM); Barahona, Dominica; La Rave Beach, St. Lucia (both AMNH); outside Pigeon I. reef, St. Lucia (USNM); St. Vincent (IRS); Crane Point, Barbados, off the castle, E. side of Barbados, 1-4 faths. (both USNM); Bequia I., Grenadines; Bonaire, S. coast of Curacao; Boca Playa, Canoa, Curacao (all AMNH); St. Michiel Bay, Williamstadt, Curacao (MCZ); Aruba Island (USNM). TRINIDAD: Chaguanos Bay (USNM). TOBAGO: Buccoo reef; W. of Pigeon Point (both USNM). BRAZIL: Bahia (USNM); Bahia, 10 faths. (AMNH); Itapoan, Salvador, Bahia

(AMNH; MORG); off Cabo Orange, Amapá, 16 faths.; off Paraíba, 20 faths.; Paripueira, Ponta Verde, Alagoas; Maceio, Ponta Verde, Alagoas; Guarapari; off Natal, R.G.N., 16 faths. (all MORG); Morro Sao Paulo, Bahia, 1 fath. (Deynzer coll.); off Mucuripe, Fortaleza, Ceara, 10 faths., *ex-pisces* (Matthews coll.; Cernohorsky coll.).

Fossil records—U. MIOCENE: Santo Domingo, Dominican Republic (Pilsbry, 1922).

Mitra rudis Gabb, 1873

(Pl. 415)

Range—Miocene of the Dominican Republic and questionably Costa Rica.

Remarks—The species is very similar to the Recent *M. nodulosa*, and is probably the ancestral form of that species. The sculpture is of the same granulose nature as in *M. nodulosa*. The type-specimens of both *M. rudis* Gabb, and *M. quemadica* Maury, are immature specimens which are ovate and have a thin, convex outer lip.

Measurements (mm)—

length	width	
31.3	13.8	Holotype of <i>rudis</i>
28.0	11.0	Holotype of <i>quemadica</i>

Synonymy—

1873 *Mitra rudis* Gabb, Trans. Americ. Phil. Society, vol. 15, p. 220 (Santo Domingo, Dominican Republic, U. Miocene; holotype in the Academy of Natural Sciences, Philadelphia, no. 3262); 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 340, pl. 24, figs. 4, 5 (figured type-specimens).

1917 *Mitra quemadica* Maury, Bull. Americ. Paleontology, vol. 5, no. 29, p. 75, pl. 11, fig. 12 (Rio Gurabo, Santo Domingo, Dominican Republic; Miocene).

?1922 *Mitra aff. rudis* Gabb, Olsson, Bull. Americ. Paleontology, vol. 9, no. 39, p. 274 (102), pl. 6, fig. 13 (Hone Walk Creek, Costa Rica; Miocene).

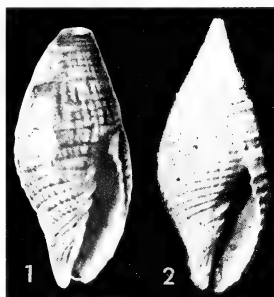


Plate 415. *Mitra (Nebularia) rudis* Gabb.

Fig. 1. Holotype from Santo Domingo, U. Miocene of the Dominican Republic (from Pilsbry, 1922, pl. 24, fig. 5; 31.3 x 13.8 mm).

Fig. 2. Holotype of *M. quemadica* Maury from Rio Gurabo, Santo Domingo, U. Miocene of the Dominican Republic (from Maury, 1917, pl. 11, fig. 12; 28.0 x 11.0 mm).

***Mitra straminea* A. Adams, 1853**

(Pl. 416, figs. 1-4; pl. 417)

Range—off North Carolina, Florida to the Gulf of Mexico, Barbados, West Indies and Brazil.

Remarks—This rare deep water species has been re-described as *M. fluviimaris* by Pilsbry and McGinty, 1949, although it has been correctly reported and localized by Dall (1889) from the Caribbean. Pilsbry and McGinty acknowledged that their new species was probably *M. straminea* A. Adams, but considered this species imperfectly described and from unknown locality. The holotype of *M. straminea*, however, is a small and worn specimen of *M. fluviimaris*, and the name will have to revert to *M. straminea* again. Some characters are reminiscent of *Cancilla*, but the radula is typically mitrine.

Habitat—On a gravel substratum, from 60 to 140 fathoms.

Description—Shell up to 31 mm (about 1¼ inches) in length, fusiformly-elongate, moderately light in weight, sutures distinct, sharply incised and sometimes very narrowly channeled. Whorls 7-8, apart from a smooth, conical protoconch of 2½-4 nuclear whorls, spire whorls slightly convex, sculptured with narrow or broad, shallow spiral grooves which produce irregular spiral cords which number from 6-9 on the penultimate and from 20-25 on the body whorl; the spiral cords are usually narrow and slightly angulate posteriorly to the sutures but become broader and flatter anteriorly, and appear as crowded, oblique spiral threads at the base of the last whorl. Longitudinal threads descend onto the whorls and form distinct axial threads in the grooves, but are less prominent upon the cords. The aperture is longer than the spire, narrow and smooth within, outer lip only moderately thickened, elongate and convex, smooth at the margin; columella with a callous glaze and with 4 or 5 moderately wide-spaced, oblique folds, siphonal fasciole narrow, slightly drawn out, straight or slightly recurved, siphonal notch shallow. White to cream or light fawn in colour under a brown, thin periostracum, ornamented with 2 broad and faint light brown bands on the body whorl leaving a pale central band, spire whorls with a few brown streaks; aperture and columella are white.

Measurements (mm)

length	width	height of aperture	
30.6	9.6	16.6	Ragged Key, Florida
28.9	9.5	15.4	Holotype of <i>fluviimaris</i>
16.1	5.4	8.8	Holotype of <i>straminea</i>
11.0	—	—	Off Fowey Light, Florida

Synonymy—

- 1853 *Mitra straminea* A. Adams, Proc. Zool. Soc. London, for 1851, p. 132 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 11, pl. 25, fig. 561; 1889 Dall, Bull. Mus. Comp. Zool. Harvard, vol. 18, p. 159.
 1882 *Mitra (Cancilla) straminea* A. Adams, Tryon, Manual Conchology, vol. 4, p. 140, pl. 41, fig. 188.
 1949 *Mitra fluviimaris* Pilsbry & McGinty, Nautilus, vol. 63, no. 1, p. 13, pl. 1, figs. 5, 5a (off Palm Beach, Florida, 100 fathoms).
 1970 *Mitra (Nebularia) straminea* A. Adams, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 14, textfig. 61 (radula).

Types—The holotype of *M. straminea* A. Adams, is in the British Museum (NH) no. 1967888, and the holotype of *M. fluviimaris* Pilsbry & McGinty, is in the Academy of Natural Sciences, Philadelphia, no. 185476. No locality

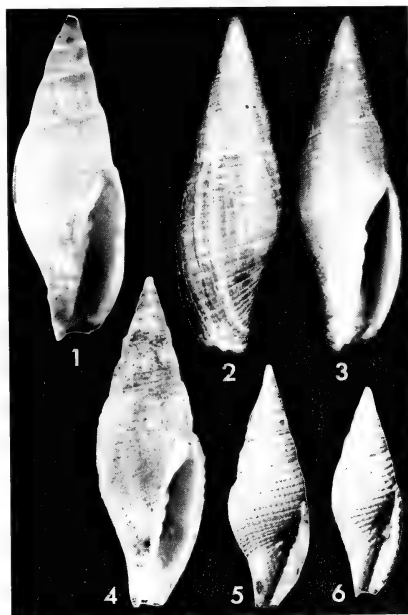


Plate 416. Figs. 1-4. *Mitra (Nebularia) straminea* A. Adams
 Figs. 5, 6. *M. (N.) almagrensis* Toulou.

Fig. 1. Holotype of *M. (N.) straminea* A. Adams; very worn specimen. (BM (NH) 1967888; 16.1 x 5.4 mm).

Figs. 2, 3. Specimen from Ragged Key, Florida, 100 fms. (WOC coll.; 30.8 x 9.8 mm).

Fig. 4. Holotype of *M. fluviimaris* Pilsbry and McGinty from off Palm Beach, Florida, 100 fms. (ANSP 185476; 28.9 x 9.5 mm).

Figs. 5, 6. Holotype and paratype of *M. (N.) almagrensis* var. *coralliophila* Olsson from Port Limon, Gatun formation, M. Miocene of Costa Rica (from Olsson, 1922, pl. 6, figs. 18, 24; fig. 5 = 18.1 x 7.1 mm; fig. 2 = 17.0 x 6.0 mm).

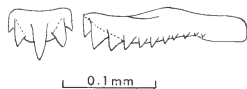


Plate 417. *Mitra (Nebularia) straminea* A. Adams. Half-row of radula. Off Palm Beach, Florida, 70 fms.

was given by Adams, and Dall's (1889) first correct locality indication of Station 36, off Cuba, 84 fathoms, is designated as the type locality of *M. straminea*.

Records—NORTH CAROLINA: off Cape Lookout, 155-170 metres (ZMC). FLORIDA: Sand Key, 65 faths.; off Fowey Light, 78 faths. (both USNM); off Palm Beach, 70-100 faths. (USNM; ANSP); off Delray Beach (DMNH). CUBA: off Cuba, 84 faths. (Dall, 1889). GULF OF MEXICO: 160 mi. N.E. of Alacran reef, 60-70 faths.; near Arrecife, Alacran, 23°13'N & 89°10'W, 84 faths. at 60°F (both USNM). PUERTO RICO: Mayaguez Harbour (USNM). LESSER ANTILLES: Barbados Island, 140 faths.; off Pelican Island, Barbados Island, 100 faths. (both USNM). BRAZIL: 180 metres, off Rio Grande.

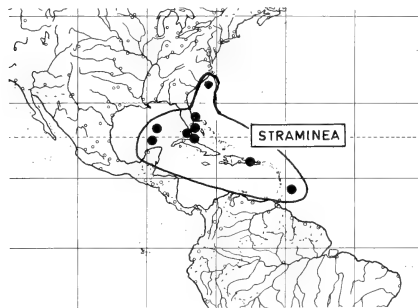


Plate 418. Geographical distribution of *Mitra (Nebularia) straminea* A. Adams.

Mitra almagrensis Toulou, 1911

(Pl. 416, figs. 5, 6)

Range—Miocene of Costa Rica and Pliocene of Mexico.

Remarks—The species has a sculpture of slightly elevated spiral cords, the spiral grooves are about the same width as the cords and sculptured by regular, raised longitudinal threads. The siphonal fasciole is straight or slightly recurved and sculptured with thin, close-set cords and the columella has 4 oblique folds.

Measurements (mm)—

length	width	
18.1	7.1	Type-specimen of <i>almagrensis</i>
17.0	6.0	Holotype of <i>coralliophila</i>

Synonymy—

- 1911 *Mitra almagrensis* Toulou, Jahrb. k. k. geol. Reichsanstalt, vol. 61, p. 481, pl. 29, fig. 13 (Tehuantepec, Mexico; Pliocene).
1922 *Mitra almagrensis* var. *coralliophila* Olsson, Bull. Americ. Paleontology, vol. 9, no. 39, p. 275 (103); pl. 6, figs. 18, 24 (Port Limon, Gatun formation, Costa Rica, M. Miocene; syntypes in Palaeontological Research Institution, Ithaca, no. 20975 and 20981).

Mitra poas Olsson, 1922

Range—Miocene of Costa Rica.

Remarks—The original description was based on what appear to be very young individuals of a mitrid closely resembling *M. almagrensis* Toulou. The original illustration is very small and lacks detail, but the author describes the species as being columbelloid in appearance, with straight-sided whorls, contracted at the base, and a sculpture consisting of 5 low, smooth spiral bands on the spire whorls; on later whorls the spirals become obsolete but appear again on the lower half of the body whorl. The outer lip is thin and the columella has 4 folds. The dimensions of one of the syntypes was given as length 21.0 mm, width 7.5 mm.

Synonymy—

- 1922 *Mitra poas* Olsson, Bull. Americ. Paleontology, vol. 9, no. 39, p. 274 (102), pl. 6, figs. 20, 21 (Port Limon, Gatun formation, Costa Rica, M. Miocene; syntypes in Palaeontological Research Institution, Ithaca, nos. 20977 and 20978).

Mitra semiferruginea Reeve, 1845

(Pl. 419, figs. 1-6)

Range—Florida to the Bahamas and Cuba.

Remarks—Although described during the last century, this rare species was not localized until over a hundred years later when it was re-described as *M. fordii* by Pilsbry & McGinty in 1949. According to available records, the species has a restricted distribution, but future collections may extend the range farther into the Caribbean.

Habitat—Sublittoral, from 3 to 48 fathoms.

Description—Shell up to 33 mm (about 1½ inches) in length, elongate-ovate and solid, sutures distinct, adpressed, irregular and bluntly nodulose. Whorls 7-8, apart from 2 smooth nuclear whorls, spire whorls convex and subangulate at the sutures, sculptured with elevated, coarse, irregular and rounded spiral cords which number from 3-5 on the penultimate and from 14-18 on the body whorl; in immature specimens the spiral

cords are thinner and more angulate. The spiral grooves are slightly narrower or broader than the cords, longitudinal striae cross the cords and become axial lirations or pits in the grooves, and some individuals have feeble axial folds. Aperture equal in height or longer than the spire, narrow and smooth within, outer lip thickened, smooth in mature individuals, parallel to the columella but slightly angulate anteriorly. Columella weakly calloused and with 4-5 oblique folds, siphonal fasciole calloused, straight or slightly recurved, siphonal notch prominent. White to cream in colour, ornamented with reddish brown axial streaks which tend to form two broad bands on the body whorl, one anteriorly to the suture and the other above the siphonal fasciole; the white central band on the body whorl is usually clear, but in some specimens a few weak axial streaks may intrude into this band. The aperture and columella are white or cream in colour.

Measurements (mm)—

length	width	height of aperture	
30.3	12.1	15.2	Holotype of <i>fordi</i>
27.6	11.3	14.3	Paratype of <i>fordi</i>
25.5	11.0	14.2	Syntype of <i>semiferruginea</i>
22.7	9.9	12.4	Lectotype of <i>semiferruginea</i>

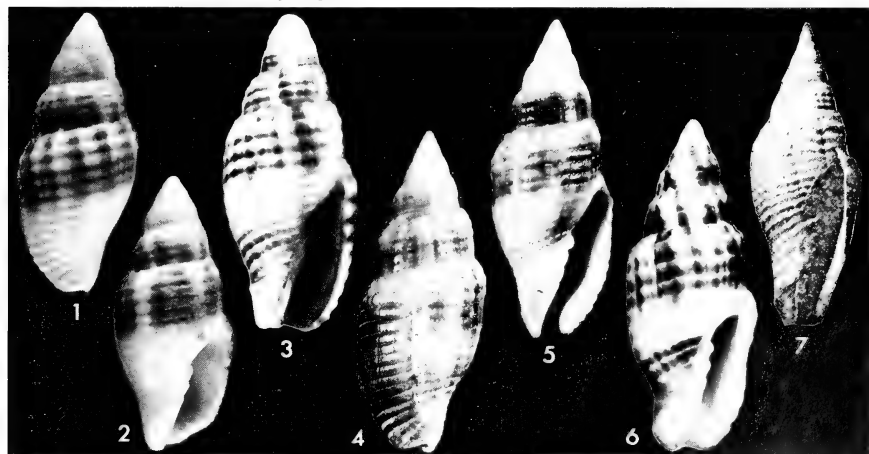


Plate 419. Figs. 1-6. *Mitra (Nebularia) semiferruginea* Reeve.
Fig. 7. *M. (N.) woodringi* Vokes.

Figs. 1, 2. Lectotype of *M. (N.) semiferruginea* Reeve; juvenile specimen (BM (NH) 1967879; 22.7 x 9.9 mm) [photo courtesy of J. Taylor, BM (NH)].

Fig. 3. Syntype of *M. (N.) semiferruginea* Reeve (BM (NH) 1967879; 25.5 x 11.0 mm).

Synonymy—

1845 *Mitra semiferruginea* Reeve, *Conchologia Iconica*, vol. 2, pl. 28, fig. 222 (no locality given); 1874 Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 12, pl. 23, fig. 504.

1874 *Mitra clara* Sowerby, *Thesaurus Conchylorum*, vol. 4, p. 11, pl. 28, fig. 652 (no locality given).

1882 *Mitra (Chrysame) semiferruginea* Jonas, *Tryon, Manual Conchology*, vol. 4, p. 152, pl. 45, fig. 310.

1949 *Mitra fordii* Pilsbry & McGinty, *Nautilus*, vol. 63, no. 1, p. 12, pl. 1, figs. 4, 4a, b (New Providence, Bahamas).

Types—The 3 syntypes of *M. semiferruginea* Reeve, are in the British Museum (NH) no. 1967879, and the immature, 22.7 mm long syntype which was illustrated by Reeve, is here selected as the lectotype. The holotype and 3 paratypes of *M. fordii* Pilsbry & McGinty, are in the Academy of Natural Sciences, Philadelphia, no. 185476. The holotype of *M. clara* Sowerby, could not be traced, but Sowerby's figure and description suggest that his species is a synonym of *M. semiferruginea*. No locality was given by Reeve, and we designate New Providence Island, Bahamas, as the type locality of *M. semiferruginea* (specimens in AMNH and ANSP).

Records—FLORIDA: off Fowey Light, 48 faths. (USNM). BAHAMA ISLANDS: Eight mile rock, Grand Bahama I. (MCZ); North Cay, Nassau, New Providence Island (DMNH); Gun Cay, Bimini Island (Pilsbry, & McGinty, 1949). CUBA: Sand-bar off Arroyos; Bay of Santa Rosa, 1-3 faths. (both USNM); Mariel Bay, Mariel; off Havana (both MCZ); Matanzas (AMNH); Varadero Beach (J. Finlay coll.).

Figs. 4, 5. Specimen from Santa Rosa Bay, N.W. Cuba (USNM 414274; 27.5 x 10.9 mm).

Fig. 6. Holotype of *M. fordii* Pilsbry and McGinty from New Providence Id., Bahamas (ANSP 185476; 30.3 x 12.1 mm).

Fig. 7. Holotype of *M. (N.) woodringi* Vokes from Springvale, U. Miocene of Trinidad (from Vokes, 1938, fig. 15; 37.8 x 14.0 mm).



Plate 420. Geographical distribution of *Mitra* (*Nebularia*) *semiferruginea* Reeve in the West Indian region.

***Mitra woodringi* Vokes, 1938**

(Pl. 419, fig. 7)

Range—Upper Miocene of Trinidad.

Remarks—The species is closely related to *M. semiferruginea* Reeve, but is slightly inflated, the spire whorls are convex, and sculptured with 5 spiral cords, later whorls are slightly shouldered and have low riblets at the slightly excavated suture. The body whorl has about 15 spiral cords, the grooves are about equal in width to the cords, the spire whorls are cancellated by longitudinal striae, the aperture is elongate, outer lip simple, the columella has 4 oblique folds, the siphonal fasciole is calloused and the siphonal notch is deep. The measurements of the holotype are length 37.8 mm, width 14.0 mm.

Synonymy—

1938 *Mitra* (*Tiara*) *woodringi* Vokes, American Museum Novitates, no. 988, p. 22, fig. 15 (Springvale, Trinidad, U. Miocene; holotype in Dept. of Palaeontology, American Museum of Natural History, New York, no. 24997).

Subgenus *Dibaphus* Philippi, 1847

Type: *Mitra edentula* Swainson, 1823

The subgenus contains only 2 Recent Indo-Pacific species and 1 Miocene fossil species from the Dominican Republic. The shells of *Dibaphus* are elongate-ovate to elongate-cylindrical, the spire is short and conical, and the sculpture consists of spiral cords or almost obsolete spiral striae. The aperture is long and narrow, smooth within, the outer lip is thickened, inflected centrally and flaring basally and the columella has from 5-11 very small, feebly developed or minute, oblique folds. The radula is typically mitrine. The two Recent species are tropical reef-dwellers and are found in coral debris and underneath rocks and coral in shallow water.

Synonymy—

- 1847 *Dibaphus* Philippi, Archiv f. Naturgeschichte, vol. 13, pt. 1, p. 61. Type-species by monotypy: *Conus edentulus* Reeve [= *Mitra edentula* Swainson, 1823]. Recent, Indo-Pacific.
 1865 *Mitroidea* Pease, Proc. Zool. Soc. London, p. 514. Type-species by monotypy: *M. multiplicata* Pease, 1865. Recent, Indo-Pacific.
 1869 *Mauritia* H. Adams, Proc. Zool. Soc. London, p. 205. Type-species by monotypy: *M. barclayi* H. Adams, 1869 [= *Mitroidea multiplicata* Pease, 1865]. (non *Mauritia* Troschel, 1863).
 1873 *Plochelaea* Gabb, Proc. Acad. Nat. Sci. Philadelphia, vol. 24, p. 271. Type-species by original designation: *P. crassilabra* Gabb, 1873. Miocene, Dominican Republic.



Plate 421. *Mitra (Dibaphus) edentula* Swainson. Half-row of radula. Polynesia. (from Cooke, 1920, fig. 4).

Mitra edentula Swainson, 1823

(Color pl. 257, figs. 35, 36; pl. 421; pl. 422, fig. 1)

Range—Agalega Island, Indian Ocean, to the Tuamotus, Hawaiian Islands and Clipperton Island.

Remarks—The species bears a superficial resemblance to *Conus mitratus* Hwass in

Bruguère, and either the species or the subgenus *Dibaphus* have occasionally been assigned to the family Coniidae. The radula, however, is typically mitrine.

Habitat—On reefs, under coral and rocks, in the intertidal zone.



Plate 422. Fig. 1. *Mitra (Dibaphus) edentula* Swainson Figs. 2, 3. *M. (D.) multiplicata* (Pease) Fig. 4. *M. (D.) crassilabra* (Gabb).

Fig. 1. Specimen of *M. (D.) edentula* Swainson from the Philippine Ids. (USNM 90663; 40.0 x 13.0 mm).

Fig. 2. Specimen of *M. (D.) multiplicata* (Pease) from Marau Sound, Guadalcanal, Solomon Ids. (Deynzer coll.; 26.2 x 8.3 mm).

Fig. 3. Holotype of *Mauritia barclayi* H. Adams from Barkly Id., Mauritius (BM (NH) 1967933; 44.6 x 13.7 mm).

Fig. 4. Lectotype of *M. (D.) crassilabra* (Gabb) from Santo Domingo, U. Miocene of the Dominican Republic (from Pilsbry, 1922, pl. 24, fig. 6; 44.2 x 19.8 mm).

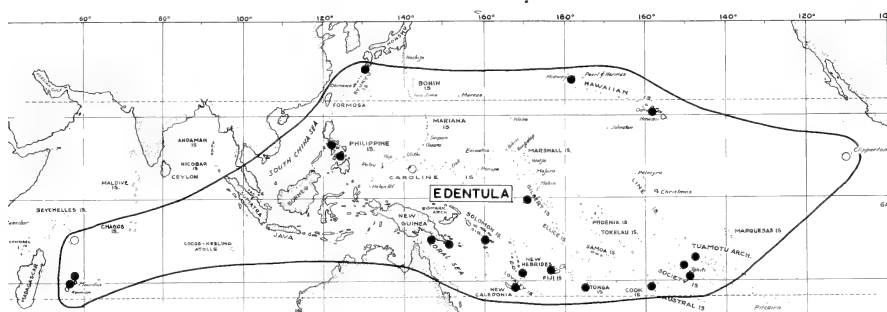


Plate 423. Geographical distribution of *Mitra* (*Dibaphus*) *edentula* Swainson.

Description—Shell up to 45 mm (about 1¾ inches) in length, elongate-cylindrical, spire short, sutures distinct and narrowly ledged. Whorls 6-7, apart from an eroded white protoconch, spire whorls almost flat-sided or slightly convex, sculptured with narrow and slightly angulate spiral cords which number from 3-7 on the penultimate and from 34-40 on the body whorl; the intervening grooves are broader than the spirals and are sculptured with dense and regular axial striae and occasionally a fine, small intermediate spiral thread. Aperture longer than the spire, very narrow and smooth within, outer lip thickened, constricted centrally but slightly flaring basally, margin of outer lip calloused and recurved, smooth or obsoletely denticulate. Columella only weakly calloused, usually only glazed, and with 8-11 very small, denticle-like folds which are actually extensions of the spiral cords; siphonal fasciole short and usually with a short, recurved tail, siphonal notch distinct. Creamy-white in colour, ornamented with broad, dark brown axial streaks which usually form 2 irregular transverse bands on the body whorl; aperture and columella cream or golden-yellow. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
41.0	14.8	27.0	New Hebrides
41.0	13.4	27.0	Mauritius
30.7	11.0	20.8	Marau Sound, Solomons
27.6	10.2	19.0	Pango Pt., New Hebrides
27.0	9.7	18.8	Port Louis, Mauritius
17.6	6.4	12.8	Nuku'alofa, Tonga Ids.

Synonymy—

1823 *Mitra edentula* Swainson, Philos. Mag. & Journal, vol. 61,

no. 301, p. 378 (no locality given); 1960 Hertlein & Allison, Veliger, vol. 3, p. 14; 1967 Cernohorsky, Veliger, vol. 9, p. 441.

1844 *Conus edentulus* Reeve, Conchologia Iconica, vol. 2, pl. 11, fig. 80.

1847 *Dibaphus edentulus* (Reeve), Philippi, Archiv f. Naturgeschichte, vol. 13, pt. 1, p. 61, pl. 3, figs. 1-3; 1873 Garrett, Proc. Zool. Soc. London, for 1872, p. 843; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 37, pl. 27, figs. 608, 609; 1880 von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 253; 1920 Cooke, Proc. Zool. Soc. London, for 1919, p. 409, textfig. 4 (radula); 1936 Hirase, Collection Japanese shells, p. 70, pl. 101, figs. 11, 12.

1858 *Dibaphus philippi* Crosse, Rev. Mag. Zoolog., vol. 10, p. 160, pl. 3, figs. 1, 1a (? Nukuhiva); 1859 Chenu, Manuel de Conchyliologie, vol. 1, p. 253, fig. 1569; 1871 Pease, Journal de Conchyliologie, vol. 19, p. 98; 1880 Garrett, Journal of Conchology, vol. 3, p. 69; 1882 Tryon, Manual Conchology, vol. 4, p. 164, pl. 47, fig. 381 (non *Mitra philippi* Beyrich, 1854).

1970 *Mitra (Dibaphus) edentula* Swainson, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 70, pl. 3, fig. 9.

Types—The whereabouts of the type-specimen of *M. edentula* Swainson, originally in the Dubois collection, and the type of *Dibaphus philippi* Crosse, are unknown. No locality was given by Swainson, but since the species is usually cited from Mauritius, we designate Mauritius as the type locality.

Records—AGALEGA ISLANDS: (von Martens, 1880). MAURITIUS: (DMNH; USNM; Powell coll.); Port Louis (Clover coll.). PHILIPPINE ISLANDS: Cebu Island (USNM); Yook, Buenavista, Marinduque; Boac, Marinduque (both Lumawig coll.). JAPAN: Osima, Osumi (USNM). CAROLINE ISLANDS: (Pease, 1871). NEW GUINEA: Island near Samarai (Hinton coll.); Taurama reef, Port Moresby (Kleckham coll.). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.; Powell coll.; Cernohorsky coll.). OCEAN ISLAND: (AIM). NEW HEBRIDES: Pango Point, Eiate I. (Allan coll.; Cernohorsky coll.); Teuma Bay, S. Eiate I. (Debant coll.); Anietyum I. (DMNH). LOYALTY ISLANDS: Lifu (USNM). FIJI ISLANDS: Yewalu reef, off Lautoka, W. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.). COOK ISLANDS: Karotonga (AIM). SOCIETY ISLANDS: Patutua, Tahiti; Point Teffao, Huahine I. (both USNM). TUAMOTU ISLANDS: Matiti I., Tikahau (USNM). HAWAIIAN ISLANDS: Honolulu, Oahu, dredger dump (USNM); Lahaina, Maui I. (DMNH). MIDWAY ISLAND: (USNM). CLIPPERTON ISLAND: (Hertlein & Allison, 1960).

***Mitra multiplicata* (Pease, 1865)**

(Pl. 422, figs. 2, 3)

Range—Mauritius to the Tuamotus and the Hawaiian Islands.

Remarks—This rare species is similar to *M. edentula* Swainson, but is more fusiform, with a more slender and higher spire and a considerably finer sculpture.

Habitat—Under rocks and coral, in the intertidal zone, and probably sublittoral.

Description—Shell up to 50 mm (2 inches) in length, fusiform-cylindrical, solid, sutures distinct but adpressed and narrowly incised. Whorls 7-8, apart from an eroded protoconch, spire whorls flat-sided, body whorl slender and only slightly convexly expanded at anterior third, first 1-2 post-nuclear whorls clathrate, later whorls sculptured with very fine and close-set, numerous and sometimes almost obsolete spiral striae, which number up to 25 on the penultimate and up to 50 on the body whorl; in juvenile and immature specimens the spirals are more prominent and considerably less numerous. Under magnification very fine longitudinal hair-lines are discernible. Aperture longer than the spire, very narrow and smooth within, outer lip thickened, constricted centrally but widening anteriorly, smooth at the margin; columella only thinly glazed and with 8-11 very small folds, siphonal fasciole slightly produced and sometimes recurved to the left, siphonal notch distinct. White, cream or fawn in colour, ornamented with wide-spaced, orange-brown spiral lines, juvenile specimens are often bluish-white and have a broad brown zone adjoining the body whorl suture; the aperture and columella are white or bluish-white. The periostracum is thin, brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
50.4	13.6	28.6	Mauritius
44.6	13.7	29.7	Holotype of <i>barclayi</i>
29.1	9.0	18.7	Mauritius
26.2	8.3	17.0	Marau Sound, Guadalcanal

Synonymy—

1865 *Mitroidaea multiplicata* Pease, Proc. Zool. Soc. London, p. 514 (Central Pacific); 1880 Garrett, Journal of Conchology, vol. 3, p. 68; 1882 Tryon, Manual Conchology, vol. 4, p. 162, pl. 47, figs. 372, 373; 1952 Kuroda & Habe, Check List Mar. mollusca Japan, p. 67.

1869 *Mauritia barclayi* H. Adams, Proc. Zool. Soc. London, p. 273, pl. 19, figs. 5, 5a (Barkly Island, Mauritius) [non *Mitra barclayi* Robillard, 1868].

1874 *Mitra dibaphiformis* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 17, figs. 309, 310 (substitute name for *Mauritia barclayi* H. Adams. 1869).

1880 *Mitroidaea barclayi* H. Adams, von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 252.

1887 *Dibaphus loebbeckeanus* Weinkauff, Syst. Conchylien-Cabinet, ed. 2, vol. 4, pt. 3, p. 2, pl. A, figs. 1, 3 (no locality given).

1952 *Mitryca paucilineata* "Dall", Tinker, Pacific Sea shells, p. 66, plate facing page, figs. in middle row (Hawaiian Islands) [nomen nudum].

1966 *Mitridia multiplicata* (Pease), Habe & Kosuge, Shells world in colour, vol. 2, p. 75, pl. 28, fig. 25.

1970 *Mitra (Dibaphus) multiplicata* (Pease), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 70, pl. 3, fig. 10 (juvenile spec.), fig. 11, 12 (figured holotype of *Mauritia barclayi* H. Adams).

Types—The type-specimen of *M. multiplicata* (Pease), could not be located and is probably lost. The holotype of *Mauritia barclayi* H. Adams, is in the British Museum (NH) no. 1967933. The type locality is Central Pacific, and this is further restricted to the Samoa Islands (specimens in USNM and BPBM).

Records—MAURITIUS: (DMNH: BMNH: Powell coll.; Clover coll.). PHILIPPINE ISLANDS: Caba L., Lubang, Mindoro (USNM). JAPAN: (Kuroda & Habe, 1952). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.; Cernohorsky coll.). FIJI ISLANDS: Suva reef, S. Viti Levu (Browne coll.). SAMOA ISLANDS: Upolu (BPBM). Ofu, Manu'a group (USNM). LINE ISLANDS: Palmyra Island (USNM). TUAMOTU ISLANDS: Vahitaki (USNM); Makaimo (Garrett, 1880). HAWAIIAN ISLANDS: (Tinker, 1952). MIDWAY ISLAND: (USNM).

***Mitra crassilabra* (Gabb, 1873)**

(Pl. 422, fig. 4)

Range—Upper Miocene of the Dominican Republic, Caribbean.

Remarks—This species is broader than the other two Recent species of *Dibaphus*, but is otherwise similar in characters. The species is almost smooth and only obscurely spirally striate, the sutures are indistinct and narrowly incised, the body whorl is long and inflated and the spire is short. The aperture is narrow, elongate and smooth within, broadening anteriorly, the outer lip is thickened, constricted centrally, with the outer lip margin simple and inflected; the columella is calloused and has 5-7 small, oblique folds, the siphonal fasciole is straight and weakly calloused and the siphonal notch is prominent. *Plochelaea gabbi* Pilsbry and Johnson, was described from a young specimen which still retains its oliviform shape and has a thinner and less constricted outer lip.

Measurements (mm)—

length	width	height of aperture	
44.2	19.8	35.4	Lectotype of <i>crassilabra</i>
27.4	12.7	24.2	Holotype of <i>gabbi</i>

Synonymy—

- 1873 *Plochelaea crassilabra* Gabb, Proc. Acad. Nat. Sci. Philadelphia, vol. 24, p. 271, pl. 11, fig. 5 (Santo Domingo, Republic of Dominica, U. Miocene; lectotype in Academy of Natural Sciences, Philadelphia, no. 3289); 1883 Tryon, Manual Conchology, vol. 5, pl. 3, fig. 22; 1899 Cossmann, Essai paléoc. comparée, vol. 3, p. 179, textfig. 32; 1917 Maury, Bull. American Paleontology, vol. 5, no. 29, p. 241, pl. 14, fig. 3.
- 1873 *Plochelaea crassilabrum* Gabb, Trans. American Philos. Society, vol. 15, p. 216; 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 341, pl. 24, fig. 6 (figured lectotype).
- 1917 *Plochelaea gabbi* Pilsbry & Johnson, Proc. Acad. Nat. Sci. Philadelphia, vol. 69, p. 166 (Santo Domingo, Dominican Republic, U. Miocene; holotype in Academy of Natural Sciences, Philadelphia, no. 3290); 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 342, pl. 24, fig. 7.
- 1970 *Mitra (Dibaphus) crassilabra* (Gabb), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 70, pl. 3, fig. 13.

Subgenus *Dibaphimitra* Cernohorsky, 1970

Type: *Mitra florida* Gould, 1856

Species of this group are intermediate in character between *Mitra* and *Dibaphus*. The shell is broad and inflated, similar to *Pterygia* in form, the whorls are convex and somewhat inflated, the aperture is moderately wide and longer than the spire, and the columella lacks the numerous, very small folds of *Dibaphus* and has regular folds instead. *Dibaphimitra* could possibly be the ancestral stock of *Dibaphus*, and may have spread from Europe to the Caribbean and the Indian Ocean, but did not reach the Pacific Ocean like species of *Dibaphus*. Species of *Dibaphimitra* are known from the Miocene of Europe and Australia and one species survives in the Caribbean region.

Synonymy—

1970 *Dibaphimitra* Cernohorsky, Bull. Auckland Inst. Museum, no. 8, pp. 28, 37. Type-species by original designation: *Mitra florida* Gould, 1856. Recent, Florida and Caribbean.

Mitra florida Gould, 1856

(Color pl. 253, fig. 12; pl. 424)

Range—Florida to the Caribbean.

Remarks—Sowerby (1874) described *Mitra fergusonii* from "Panama", but no specimens have been collected to date as far south as the east coast of Panama.

Habitat—Sublittoral, from 3 to 15 fathoms.

Description—Shell up to 61 mm (about 2½ inches) in length, moderately light in weight, sutures distinct but narrowly incised. Whorls 5½-6, apart from a protoconch of 2½ smooth and slightly button-shaped nuclear whorls, spire whorls convex and inflated, sculptured with fine and almost obsolete spiral striae which number from 7-9 on the penultimate and up to 42 on the body whorl; the spirals become usually weak and obsolete on the body whorl, with the exception of about 10-13 oblique cords at the base. Aperture longer than

the spire, widening basally, smooth within, outer lip slightly angulate posteriorly in immature specimens and descending almost parallel to the columella, margin of outer lip moderately thin and simple. Columella not calloused, and with 6-7 oblique folds which are rather small for the size of the shell; siphonal fasciole straight and slightly calloused, siphonal notch distinct. White or creamy-white in colour, ornamented with spiral rows of small, laterally elongated dark brown spots and orange-brown blotches on the spire whorls and irregular clouded areas of the same colour on the body whorl; the aperture and columella are white.

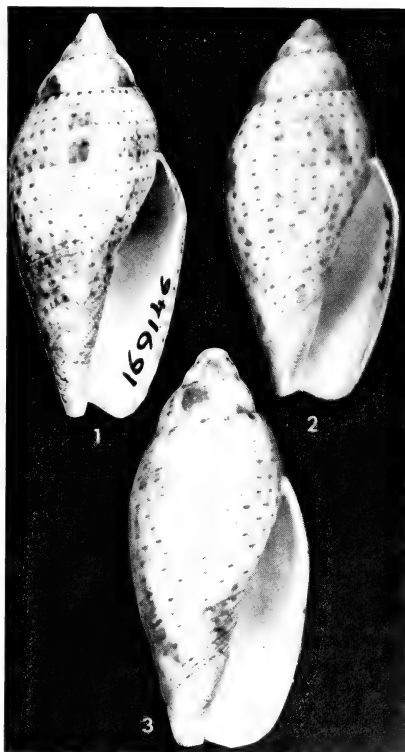


Plate 424. *Mitra (Dibaphimitra) florida* Gould.

Fig. 1. Holotype from Florida (MCZ 169146; 44.8 x 20.0 mm).

Fig. 2. Specimen from Marco Id., Florida (USNM 606965; 47.3 x 21.7 mm).

Fig. 3. Holotype of *M. fergusonii* Sowerby from "Panama" (BM (NH) 1879.2.26.133; 42.8 x 19.5 mm).

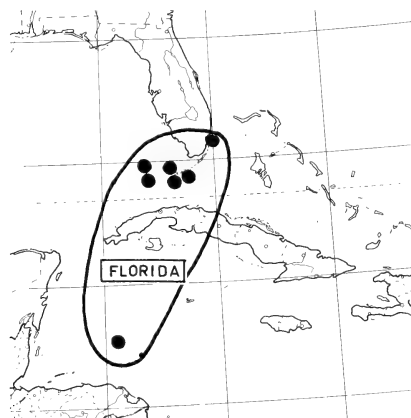


Plate 425. Geographical distribution of *Mitra (Dibaphimitra) florida* Gould.

Measurements (mm)—

length	width	height of aperture	
59.0	24.9	37.8	Locality unknown
47.3	21.7	30.4	Marco I., Florida
44.8	20.0	29.3	Holotype of <i>florida</i>
42.8	19.5	29.6	Holotype of <i>fergusoni</i>

Synonymy—

1856 *Mitra florida* Gould, Proc. Boston Soc. Nat. History, vol. 6, p. 14 (Florida); 1882 Tryon, Manual Conchology, vol. 4, p. 116, pl. 34, fig. 35; 1941 Bayer, Nautilus, vol. 55, no. 2, p. 45, fig. 18; 1942, Nautilus, vol. 55, no. 3, p. 78, figs. 3-5 (animal and radula); 1954 R. T. Abbott, American Seashells, p. 248, pl. 13, fig. i; 1964 Johnson, U.S. Nat. Mus. Bulletin, no. 239, p. 77, pl. 4, fig. 10 (figured holotype).

1874 *Mitra fergusoni* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 3, pl. 6, figs. 70, 71 (Panama); 1882 Tryon, Manual Conchology, vol. 4, p. 116, pl. 34, fig. 32; 1887 Dall, The Conchologist's Exchange, vol. 2, no. 1, p. 9; 1911 Henderson, Nautilus, vol. 25, no. 6, p. 71.

1970 *Mitra (Dibaphimitra) florida* Gould, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 37, pl. 3, fig. 6.

Types—The holotype of *M. florida* Gould, is in the Museum of Comparative Zoology, Harvard University, no. 169146 (old no. A-4548), and the holotype of *M. fergusoni* Sowerby, is in the British Museum (NH), no. 1879.2.26.133. The type locality is Florida.

Records—FLORIDA: Lauderdale-by-the-Sea (DMNH); Marco Island; Lone Key, near Key West; on reef, Dry Tortugas; Sand Key, Key West; Conch Key, 1-5 ft. (all USNM); Delta Shoal, Florida Keys, 4 faths.; off Pelican Shoals, near Key West, 3 faths. (both AMNH); coral reef E. of Islandia Key, Florida Keys; outer reef at Islamorada, Florida Keys; outer reef off Geiger Key, 20 ft. (all Eker coll.); Loggerhead Key, Dry Tortugas (Bayer, 1941); off Fisher Island, Dade County, 80 ft.; S. end of Carysfort reef, 10 faths. (both Bayer, 1942). CARIBBEAN: Swan Islands, between Cuba and Honduras (USNM).

Mitra javanensis Altena, 1938

(Pl. 426; fig. 3)

Range—Lower Micene of Java, Indonesia.

Remarks—Pannekoek (1936) originally described the species under the homonymous name *M. javana*, and based her description on a broken specimen with missing spire whorls and a fractured outer lip. The sculpture was described as consisting of 4 smooth and broad spiral cords which are divided by sharp grooves which are axially striate, a fifth cord being partially covered by the following whorl. This sculpture persists to the shoulder of the body whorl and then becomes obsolete towards the base which has weak and obsolete spiral threads. The body whorl is inflated at the shoulder and becomes weakly concave to-

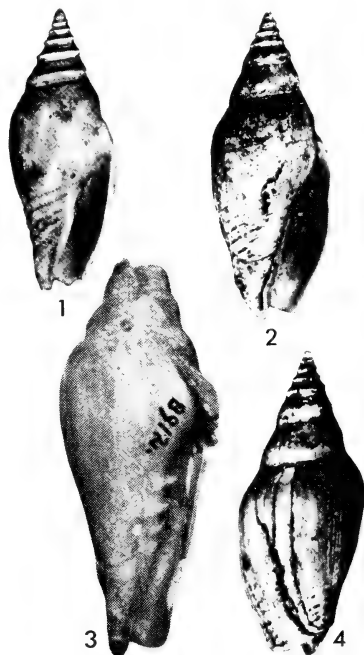


Plate 426. Figs. 1, 2, 4. *Mitra (Dibaphimitra) bantamensis* Oostingh Fig. 3. *M. (D.) javanensis* Altena.

Figs. 1, 2, 4. *M. (D.) bantamensis* Oostingh from Tjirantjabeureum, Sth. Bantam, Pliocene of Java (from Oostingh, 1939, pl. 11, figs. 199, 200; fig. 1 = holotype now placed in *Cancilla* (subgenus *Ziba*).

Fig. 3. Holotype of *M. (D.) javanensis* Altena from Ngampel, Rembang formation, L. Miocene of Java (from Pannekoek, 1936, pl. 1, fig. 17; 42.0 × 16.0 mm).

wards the base. The aperture is longer than the spire, the columella is weakly calloused and has 4 strong, oblique folds, the siphonal canal is drawn out into a point and the siphonal notch is prominent. The approximate measurements were given as length 42.0 mm, width 16.0 mm.

Synonymy—

- 1936 *Mitra (Mitra) javana* Pannekoek, Geol. Inst. Meded. Univ. Amsterdam, no. 60, p. 37, pl. 1, fig. 17 (Ngampel, Rembang formation, Java, Indonesia, L. Miocene; type-specimen in Geological Institute, Amsterdam University) [non *Mitra javana* K. Martin, 1880].
1938 *Mitra javanensis* Altena, Natuurk. Tijdschr. Nederl.-Indie, vol. 98, no. 4, p. 211 (substitute name for *M. javana* Pannekoek, 1936).

Mitra dennanti Tate, 1889

(Pl. 427, fig. 1)

Range—Miocene of Victoria, Australia.

Remarks—The species, which has been compared with the Caribbean *M. florida* Gould, by Harris (1897), is similar in shape, has a long body whorl and a short spire, 4 inflated convex whorls and a protoconch of $3\frac{1}{2}$ smooth nuclear whorls, with the first two being nipple-like. The sculpture consists of spiral threads which number about 6-7 on the penultimate whorl, persist with about half-dozen spiral threads to the body whorl but sometimes become obsolete centrally and re-appear again as oblique spiral threads towards the

base of the shell. The aperture is longer than the spire, moderately narrow but broadening basally and the outer lip is moderately thin and simple; the columella is weakly calloused and has 4 prominent, oblique folds and the siphonal fasciole is straight.

Measurements (mm)—

length	width	height of aperture	
47.0	20.0	30.0	Syntype of <i>dennanti</i>
35.0	16.2	22.8	Muddy Creek, Victoria
33.0	16.0	22.0	Syntype of <i>dennanti</i>

Synonymy—

- 1889 *Mitra dennanti* Tate, Trans. & Proc. Roy. Soc. Sth. Australia, vol. 11, p. 137, pl. 3, fig. 3 (Lower beds at Muddy Creek, Victoria, Australia, Miocene; ? type-specimen probably in the Tate collection, University of Adelaide).
1897 *Conomitra dennanti* Tate, Harris, Cat. Tert. Moll. British Museum, p. 130, pl. 5, figs. 4a, b (protoconch only).
1970 *Mitra (Dibaphimitra) dennanti* Tate, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 70, pl. 3, fig. 70.

Mitra transsylvanica Hoernes and Auinger, 1880

(Pl. 427, fig. 2)

Range—Miocene of Rumania.

Remarks—The description of the species has been credited to M. Hoernes by the authors, but his name was inscribed on Museum labels and is an unpublished MS name. The abbreviated, translated description is as follows:

Shell oviform, up to 31 mm in length, ventricose, with 4-5 convex whorls, last whorl more than three-quarter of the total length. On the spire whorls are extremely fine and close-set axial riblets which are bisected by equally fine spiral striae and produce a net-like sculpture; on the last 2 whorls there is no trace of the axial riblets. The spiral striae are somewhat wider spaced on the last 2 whorls and become almost obsolete on the body whorl, with the exception of oblique basal cords. The aperture is elongate, moderately wide anteriorly, the outer lip is thin and simple; the columella is calloused and has 4-5 strong, oblique folds. There is a considerable variation in form, both broad and slender individuals being known. The colour is partly preserved in some specimens and the ornamentation consists of brown spiral lines which merge and form broad bands.

Measurements (mm)—

length	width	
28.0	13.5	Syntype of <i>transsylvanica</i>
26.5	14.0	Syntype of <i>transsylvanica</i>

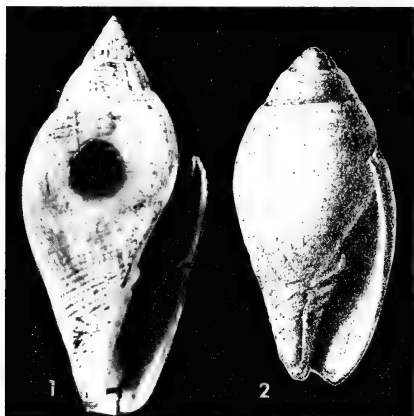


Plate 427. Fig. 1. *Mitra (Dibaphimitra) dennanti* Tate from Muddy Creek, Victoria, Miocene of Australia (Dept. Palaeont., BM (NH); 35.0 x 16.2 mm).

Fig. 2. Holotype of *M. (D.) transsylvanica* Hoernes and Auinger from Lapugy, Vienna Basin, Miocene of Rumania (from Hoernes & Auinger, 1880, pl. 11, fig. 1; 26.5 x 14.0 mm).

Synonymy—

1880 *Mitra* (*Cylindra*) *transsylvanica* "M. Hoernes", Hoernes & Auinger, Abh. k. k. geol. Reichs-Anstalt Wien, vol. 12, pt. 2, p. 90, pl. 11, figs. 1, 1a, 2 (Lapugy, Siebenbürgen, Vienna

Basin, Miocene).

1970 *Mitra* (*Dibaphimitra*) *transsylvanica* Hoernes & Auinger, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 70, pl. 3, fig. 8.

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

**List Of Species Described
In The Genus *Strigatella*
And Excluded From The Mitridae**

Subgenus *Strigatella* Swainson, 1840

Type: *Mitra paupercula* (Linnaeus, 1758)

Species of the subgenus *Strigatella* are moderate in size and rarely exceed 50 mm (2 inches) in length and are generally solid and squat. The sculpture consists of spiral cords, striae or granules, and the most important feature is the thickening of the outer lip, which is indicated as a gentle calloused swelling on the interior edge or may appear as a prominent but bluntly triangular denticle. In some species of *Strigatella* the radula is slightly modified, the laterals are more cleaver-shaped and denticles are usually missing on the last one-third of the plate. This type of radula, however, is also occasionally present in species of *Nebularia*, and a typically mitrine radula is sometimes found in *Strigatella* species (e.g. *M. colombelliformis* Kiener, and *M. auriculoides* Reeve). The egg-capsules of *Strigatella* are claviform and similar to those of *Mitra* s. str.

All the known species of *Strigatella* inhabit the tropical Indo-Pacific region, the sole exception being *M. tristis* Broderip, from the west coast of America. Only two fossil species have been recorded from the Indonesian and Caribbean Miocene. *Strigatella* species are rock and reef-dwellers and are also sometimes dredged in moderately deeper water on a coral-rubble substratum.

Synonymy—

1840 *Strigatella* Swainson, Treatise Malacology, pp. 130, 131, 319. Type-species by subsequent designation (Gray, 1847): *Mitra zebra* Lamarck, 1811 [= *Voluta paupercula* Linnaeus, 1758]. Recent, Indo-Pacific.

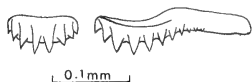


Plate 428. *Mitra (Strigatella) paupercula* (Linnaeus). Half-row of radula. Nadroga reef, Fiji Islands.

Strigatella americana Dall, 1915, U.S. Nat. Mus. Bulletin, vol. 90, p. 61, pl. 9, fig. 2 (Chipola River marls, Florida; L. Miocene) = *Enaeta* H. & A. Adams, 1853, family Volutidae.

Strigatella (Mitreaola) brachyspira Cossmann and Pissarro, 1901, Bull. Soc. géol. Normandie, vol. 20, p. 90, pl. 10, fig. 18 (Hauteville, Cotentin, France; Eocene) = *Mitreaola* Swainson, 1833, family Volutidae.

Strigatella (Mitreaola) nodulosa Doncieux, 1908, Ann. Univ. Lyon, vol. 22, p. 60, pl. 3, figs. 7a, b (Fabrezan, France; U. Paleocene) = *Mitreaola* Swainson, 1833, family Volutidae.

Strigatella peruviana Olsson, 1931, Bull. American Paleontology, vol. 17, p. 209, pl. 20, figs. 4, 6 (near Puercotilla, Chira formation, N. Peru; L. Oligocene) = *Mitreaola* Swainson, 1833, family Volutidae.

Indo-Pacific *Strigatella*

***Mitra paupercula* (Linnaeus, 1758)**

(Color pl. 258, figs. 1-3; pl. 428; 430)

Range—Red Sea to Polynesia and the Hawaiian Islands.

Remarks—A very common species which is highly variable in form and colour ornamentation, and which is related to the other two similar species *M. pica* and *M. retusa*. These three species can usually be separated on the basis of the following characters: *M. retusa* has an outer lip which is prominently crenulate along its entire length, the base of the body whorl has strong spiral cords which are usually granulose, and the spire is very short in relation to the body whorl length. These features and the usually quite distinct colour ornamentation easily differentiate *M. retusa* from *M. pica* and *M. paupercula*. The latter two species are more closely similar in apertural features, both having a smooth interior swelling at the start of the outer lip, and the anterior edge of the outer lip is either smooth or obsoletely crenulate. *M. pica*, however, has a more elongate, cylindrical form, a distinctly less convex body whorl and a spiral sculpture which is continuous from the spire whorls to the base. In *M. paupercula* the body whorl is smooth apart from 6-10 basal cords.

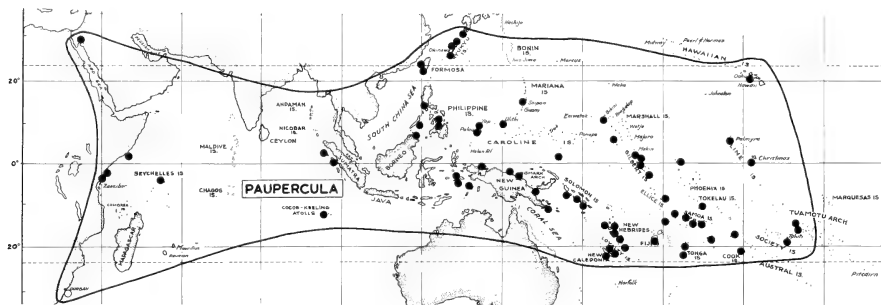


Plate 429. Geographical distribution of *Mitra (Strigatella) paupercula* (Linnaeus).

Habitat—Under coral rocks and basalt boulders, throughout the reef-flat but more frequently towards the high tide zone; usually in shallow water of the intertidal zone but rarely found deeper than 2 fathoms.

Description—Shell up to 39 mm (about 1½ inches) in length, elongate-ovate or ovate, solid, sutures weakly impressed and narrowly incised. Whorls 5-7, apart from a protoconch of 2 white nuclear whorls, usually smooth apart from 6-10 weak basal cords and very fine longitudinal striae which are usually visible only under magnification. In some populations, however, the spiral cords are quite distinct and number from 5-9 on the penultimate whorl and become obsolete past the shoulder of the body whorl; some individuals even develop weak axial folds on the body whorl, which coincide with the white axial streaks. Aperture longer than the spire, only moderately narrow, smooth within; outer lip prominently thickened, inflected near the start but broadening anteriorly, anterior margin of outer lip occasionally with 4-9 very weak crenules, which may become obsolete through an overlaid callus; the interior swelling of the outer lip is variable and is either moderately weak or prominent. The columella is calloused, callus more prominent anteriorly, and with 4 or 5 oblique folds; siphonal fasciole short and straight, occasionally weakly calloused, siphonal notch moderately distinct. Blackish brown to black in colour, ornamented with moderately wide-spaced, longitudinal, straight or wavy white stripes, which are either continuous or centrally interrupted on the body whorl; aperture greyish-brown, usually bluish-white near the margin, columella purple-brown, folds white. Periostracum thin, brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
35.9	15.3	20.2	Lectotype of <i>zebra</i> Lk.
32.0	13.9	18.5	Cabcan, Philippines
25.2	13.2	16.5	Lectotype of <i>zebra</i> Garr.
20.9	12.0	15.4	Niue Island
13.5	8.3	9.8	Okinawa, Ryukyu Ids.

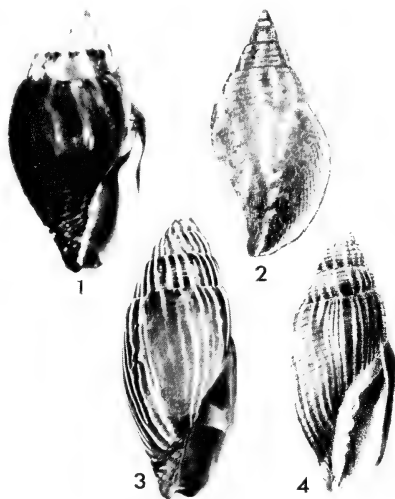


Plate 430. Fig. 1. *Mitra (Strigatella) paupercula* (Linnaeus) Figs. 2-4. *M. (S.) pica* (Dillwyn).

Fig. 1. Lectotype of *Strigatella zebra* Garrett from the Fiji Ids. or Samoa. (BPBM; 25.2 x 13.2 mm).

Fig. 2. Lectotype figure of *Mitra (Strigatella) pica* (Dillwyn); juvenile specimen (from Chemnitz, 1795, pl. 178, fig. 1722).

Fig. 3. Lectotype of *M. tigrina* A. Adams from the Philippine Ids. (BM (NM) 1967896; 36.4 x 14.2 mm).

Fig. 4. Type figure from *M. jucunda* Tapparone-Canefri from Mauritius (from Tapparone-Canefri, 1874, pl. 28, fig. 3; 43.0 x 15.0 mm).

Synonymy—

- 1758 *Voluta paupercula* Linnaeus, *Systema Naturae*, ed. 10, p. 731 (refers to Gualtieri, pl. 54, fig. L) [Mediterranean = error!]; 1969 Cernohorsky, *Zool. Journ. Linn. Soc. London*, vol. 48, p. 352.
- 1780 "*Turricula pauperum*" Chemnitz, *Syst. Conchylien-Cabinet*, vol. 4, p. 227, pl. 149, figs. 1386, 1387 [non binomial].
- 1798 *Mitra venosa* Röding, *Museum Boltenianum*, p. 137 (refers to Chemnitz, *op. cit.*, figs. 1386, 1387) [no locality given].
- 1811 *Mitra zebra* Lamarck, *Ann. Mus. d'Hist. Nat. Paris*, vol. 17, p. 215 (Indian Ocean); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 19, pl. 21, figs. 444, 445; 1969 Cernohorsky, *Revue Suisse Zoologie*, vol. 76, p. 978, pl. 5, fig. 36 (figured lectotype).
- 1817 *Mitra radiata* Schumacher, *Essai nouv. système*, p. 238 (reference restricted to Chemnitz, *op. cit.*, figs. 1386, 1387) [no locality given].
- 1822 *Mitra paupercula* (Linnaeus), Lamarck, *Hist. nat. anim. s. vertebres*, vol. 7, p. 317; 1838, Kiener, *Species général iconographie coquilles vivantes*, vol. 3, p. 48, pl. 15, fig. 48; 1844 Reeve, *Conchologia Iconica*, vol. 2, pl. 12, fig. 84; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 19, pl. 21, figs. 428, 429; 1906 E. A. Smith, *Ann. Natal Govt. Museum*, vol. 1, pt. 1, p. 32.
- 1833 *Mitra retusa* Lamarck, Quoy & Gaimard, *Voy. L'Asirolabe*, vol. 2, p. 645, pl. 45, figs. 19-22 (non Lamarck, 1811).
- 1880 *Strigatella paupercula* Linnaeus, Garrett, *Journal of Conchology*, vol. 3, p. 34; 1880 von Martens, *Meeresf. Mauritius & Seychellen*, p. 257; 1913 Schepman, *Siboga-Expedite*, vol. 49d, p. 278, pl. 23, fig. 5 (radula); 1965 Cernohorsky, *Veliger*, vol. 8, p. 112, pl. 17, fig. 59; 1966, *Veliger*, vol. 9, p. 110, textfig. 17 (radula).
- 1880 *Strigatella zebra* Garrett, *Journal of Conchology*, vol. 3, p. 35 (Fiji and Samoa Islands).
- 1882 *Mitra (Strigatella) paupercula* Linnaeus, Tryon, *Manual Conchology*, vol. 4, p. 156, pl. 46, fig. 340; 1967 Orr Maes, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 119, no. 4, p. 139; 1970 Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 72, pl. 4, fig. 1.
- 1882 *Mitra (Strigatella) virgata* Reeve, Tryon, *ibid.*, p. 156, pl. 46, fig. 341 (non Reeve, 1844).
- 1923 *Mitra (Strigatella) paupercula var. obtusata* Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, pt. 2, p. 149 (Isle des Pins, New Caledonia).

Types—The holotype of *M. paupercula* (Linnaeus), is not in the Linnean collection, London, and the writer (1969) designated the Gualtieri figure L, on plate 54, as the lectotype of the species. The lectotype of *M. zebra* Lamarck, is in the Muséum d'Histoire Naturelle, Geneva, no. 1102/75, and the lectotype, here designated, and 3 syntypes of *Strigatella zebra* Garrett, are in the Bernice P. Bishop Museum, Honolulu. *Mitra radiata* Schumacher, is a composite species consisting of *M. paupercula* and *M. retusa* Lamarck; we designate the specimen figured in Schumacher's first reference to Chemnitz, 1780, figures 1386, 1387, which represent *M. paupercula*, as the lectotype of *M. radiata*. Linnaeus' locality indication of "Mediterranean" is erroneous, and Tg Nama, Ambon Bay, Ambon Island, Indonesia, is here designated as the type locality of *M. paupercula* (specimens in WAM).

Records—RED SEA: Eilat, Gulf of Aqaba (USNM). EAST AFRICA: Mogadiscio, Somalia; Mombasa, Kenya; Malindi, N. of Mombasa, Kenya (all USNM). INDIAN OCEAN ISLANDS: Poivre, Seychelles (Cernohorsky coll.); Pulou Penjang, Cocos-Keeling I. (USNM). SOUTH AFRICA: Durban (E. A. Smith, 1906). CEYLON: Hikkoduma (G. Kline, DMNH). INDONESIA: Mentawai I., Pulau Stupai, S. W. Sumatra; Sapang Ayar, N. Borneo; Island W. shore Veecken's Bay, S. Pagi I. (all USNM); Tg Nama, Ambon Bay, Ambon I.; Pomo I., Haruku Straits, E. of Ambon I., 1-2 faths; N. shore of Warbal I., W. of Nulu Rowa, Kai I. (all WAM). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.); Cebu, Cebu I. (Dan coll.; Cernohorsky coll.); off coast of Cabacaban, Bataan, Luzon (Cernohorsky coll.); Palawan (Powell coll.). FORMOSA: Liu Chiu Chao, between Penghu and Taiwan (Steiner coll.; AMNH); near Hung Tou Tsun (both USNM); Tainan beach (AMNH). RYUKYU ISLANDS: Nago, Okinawa (USNM; Powell coll.); Okinawa-Shima; Ohshima, Okinawa (both USNM); Amami-Oshima (Powell coll.); Minatogawa, Okinawa (Cernohorsky coll.). JAPAN: Osima, Osumi (USNM). MARIANAS: Hagman beach, Saipan (USNM). PALAU ISLANDS: Kavgangel; Malakal Harbour (both USNM); Eil Malk (Powell coll.). CAROLINE ISLANDS: Asor I., Ulithi Atoll; Kapingamarangi (both USNM). MARSHALL ISLANDS: Enyu I., Bikini Atoll, Elizabeth I., Jaluit Atoll; Enybor I., Jaluit Atoll (all USNM). NEW GUINEA: Celeo I., 5 mi. off Aitape; Huon Gulf (both USNM); Pai I., Mios Woendi, Schouten I. (USNM; Powell coll.); Samarai Island (Kleckham coll.); near mouth of Ramu River (AIM); 1 mi. E. of Biak wharf (Powell coll.). SOLOMON ISLANDS: Gizo (Steiner coll.); Pavuvu I., Russell Strait; Lunga, Guadalcanal (both USNM); Marau Sound, Guadalcanal (Cernohorsky coll.); Reef Is. (T. Phillips, DMNH). NEW HEBRIDES: Little Malo Kili Kili, near Espiritu Santo; Black beach, Tanna I. (both USNM); Ambrin Island, Pango Point, Efate I. (both AIM); Ure I., opposite E. coast of Malekula I. (Cernohorsky coll.). NEW CALEDONIA: Konebini; Nau Island (both USNM). LOYALTY ISLANDS: Hot Deguala, Uvea (USNM); Lifu (AIM). GILBERT & ELLICE ISLANDS: Apamama, Gilbert I.; Onotoa Atoll, Gilbert I. (both USNM); Bikenibei, Tarawa I., Gilbert I. (Foreman coll.); Nukulai, Ellice I., Kingsmill Island (both USNM). WALLIS & FUTUNA ISLANDS: Anse de Sigave, Hoom I., Futuna I., E. coast of Faioa, Wallis I. (both USNM). FIJI ISLANDS: Lomalagi, S. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: Nanuku Iti (USNM); Nuku'alofa, Tongatapu (Gay coll.); Haapai (Powell coll.). SAMOA ISLANDS: Ofu, Manu'a group; Fehialupo Road, Savaii (both USNM); Apia, Upolu (Cernohorsky coll.); Tuasivi, Savaii; Vailele beach (both Powell coll.); Swains Island (USNM). NIUE ISLAND: Alofi (USNM; Cernohorsky coll.). COOK ISLANDS: Palmerston Island (Steiner coll.); North Island, Palmerston group; Black Rock, Rarotonga (both USNM); Rarotonga (AIM). BAKER ISLAND: (USNM). LINE ISLANDS: Palmyra Island (USNM); Christmas Island (Powell coll.). SOCIETY ISLANDS: Patutoa, Tahiti (USNM); Papete, Tahiti (Clover coll.). TUAMOTU ISLANDS: Temao Harbour, Makatea I.; Maia, Tikahau (both USNM). HAWAIIAN ISLANDS: Honolulu, Oahu, dredger dump (USNM).

***Mitra pica* (Dillwyn, 1817)**

(Color pl. 258, figs. 4, 5; pl. 430, figs. 2-4)

Range—Mauritius to New Guinea and the Ryukyu Islands.

Remarks—The species is similar to *M. paupercula* (Linnaeus), but differs in being more slender and cylindrical in form, the body whorl is longer, the interior callus of the outer lip is weak and the spiral sculpture is continuous from the spire whorls to the base.

Habitat—On reefs, under rocks, in the intertidal zone.

Mitra retusa Lamarck, 1811

(Color pl. 258, figs. 6-8; pl. 431)

Range—Seychelles Island to Tonga and the Samoa Islands.

Remarks—The species is similar to but less common than *M. paupercula* (Linnaeus), and differs in having a very long body whorl and a short spire, and being broad at the shoulder and narrowing towards the base; the lower half of the body whorl has prominent, wide-spaced spiral cords, the outer lip is coarsely crenulate along its entire length and the interior of the aperture is dark mauve or purple-brown.

Habitat—On reefs, under rocks and coral, in the intertidal zone.

Description—Shell up to 30 mm (about 1¼ inches) in length, elongate-ovate to cylindrically-ovate, heavy and solid, sutures distinct and narrowly incised, body whorl long. Whorls 5-7, apart from an eroded protoconch, spire whorls convex and usually roundly angulate at the sutures on the last 2 whorls, sculptured with fine, shallow and punctate spiral grooves which number from 3-5 on the penultimate and from 10-22 on the body whorl; the spiral grooves are frequently obsolete on the posterior of the body whorl, but are usually pronounced as wide-spaced spiral cords on the lower half of the body whorl. Aperture longer than the spire, very narrow and smooth within, outer lip prominently thickened, constricted and slightly thickened on the interior margin of the outer lip, which is also prominently crenulate. Columella calloused, and with 4-5

strong, oblique folds, parietal wall with a small callus-pad in senile individuals; siphonal fasciole straight, siphonal notch moderately distinct. Reddish-brown to dark brown in colour, ornamented with close-set or wide-spaced, wavy longitudinal lines which usually terminate as small spots basally; the axial lines are crossed by a white peripheral line on the body whorl, but this line may become obsolete and visible only as slightly thickened spots on the axial lines. The aperture is dark mauve or purple-brown in fresh specimens and becomes paler towards the interior, the columella is brown or purple-brown and the folds and parietal callus are light violet. The periostracum is thin, brown, moderately translucent and finely longitudinally striate.

Measurements (mm)—

length	width	height of aperture	
25.8	13.4	18.0	Lectotype of <i>virgata</i>
25.2	13.2	17.2	Cuvu beach, Fiji Ids.
22.2	11.4	14.6	Holotype of <i>signa</i>
20.3	13.0	10.5	Lectotype of <i>retusa</i>
19.0	10.6	14.0	Malekula I., New Hebrides
14.0	7.5	10.0	Marau Sound, Solomon Ids.
10.0	6.1	7.8	Holotype of <i>tornatelloides</i>

Synonymy—

- 1811 *Mitra retusa* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 217 (Indian Ocean); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 49, pl. 15, fig. 49; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 25, fig. 199; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 19, pl. 21, figs. 447, 448; 1880 Garrett, Journal of Conchology, vol. 3, p. 25; 1909 E. A. Smith, Proc. Malac. Soc. London, vol. 8, p. 369; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 982, pl. 6, fig. 43 (figured lectotype).
- 1841 *Mitra lineata* Kuster, Syst. Conchylien-Cabinet, ed. 2, vol. 5, p. 121, pl. 16, figs. 19, 20 (no locality given) [non *M. lineata* Schumacher, 1817; nec Kuster, 1841].
- 1844 *Mitra virgata* Reeve, Conchologia Iconica, vol. 2, pl. 25, fig. 197a only (Luzon, Philippines) [non *M. virgata* Bosc, 1802].
- 1845 *Mitra tornatelloides* Reeve, Conchologia Iconica, vol. 2, pl. 38, fig. 316 (Philippine Islands) [juvenile specimen]; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 24, pl. 16, fig. 294.
- 1880 *Strigatella paupercula* var. *retusa* Lamarck, von Martens, Beitr. Meeresf. Mauritius & Seychellen, p. 257.
- 1882 *Mitra (Strigatella) retusa (pars)* Lamarck, Tryon, Manual Conchology, vol. 4, p. 156, pl. 46, figs. 342, 343 only.
- 1918 *Mitra amanda* Bartsch, Proc. Biol. Soc. Washington, vol. 31, p. 183 (Dumurug Point, Cataingan Bay, Masbate, Philippines) [non *M. amanda* Reeve, 1845].
- 1919 *Mitra signa* Bartsch, Nautilus, vol. 33, no. 1, p. 31 (substitute name for *M. amanda* Bartsch, 1918).
- 1965 *Strigatella retusa* Lamarck, Cernohorsky, Veliger, vol. 8, p. 113, pl. 18, fig. 64; 1966, Veliger, vol. 9, p. 110, textfigs. 18a, b (radula and penis).

Types—The lectotype of *M. retusa* Lamarck, is in the Muséum d'Histoire Naturelle, Geneva, no.

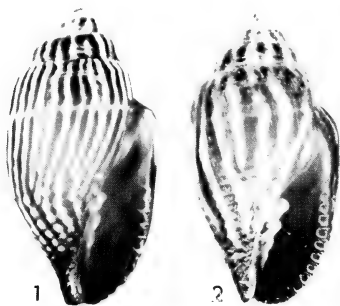


Plate 431. *Mitra (Strigatella) retusa* Lamarck.

Fig. 1. Lectotype of *M. virgata* Reeve from Luzon, Philippine Ids. (BM (NH); 1874.12.11.141; 25.8 x 13.4 mm).

Fig. 2. Holotype of *M. signa* Bartsch from Dumurug Point, Cataingan Bay, Masbate, Philippine Ids. (USNM 231815; 22.2 x 11.4 mm).

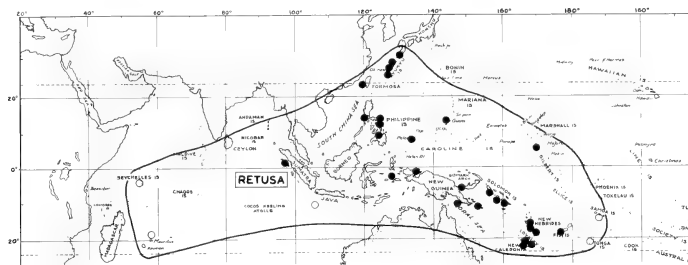


Plate 432. Geographical distribution of *Mitra (Strigatella) retusa* Lamarck.

1108/23. Reeve's *M. virgata* (non Bosc, 1802), is a composite species consisting of *M. retusa*, illustrated in figure 197a, and *M. paupercula* (Linnaeus), depicted in figure 197b. Only the specimen of *M. retusa*, ex-Taylor collection, remains in the British Museum (NH) no. 1874.12.11.141, and this specimen is designated as the lectotype of *M. virgata*; the juvenile holotype of *M. tornatelloides* Reeve, is in the same Institution, B.M. (NH) no. 1967898. *Mitra signa* Bartsch, is also a composite species: the holotype in the National Museum of Natural History, Washington, no. 231815, is *M. retusa*, 4 paratypes are *M. paupercula* and 1 paratype is *M. litterata*. The type locality is Indian Ocean, and we designate Veckeens Bay, South Pagi Island, Indonesia, as the type locality.

Records—INDIAN OCEAN ISLANDS: Mahé I., Seychelles I.; Mauritius (both von Martens, 1880); Christmas Island (E. A. Smith, 1909). INDONESIA: Island W. shore of Veckeens Bay, S. Pagi I. (USNM); S. coast of Gomumu I., S. of Obi I. (WAM). PHILIPPINE ISLANDS: Pangangon I., Bohol (Steiner coll.); Gubat Bay, Luzon; Manila Bay, Luzon; Dumurug Point, Catangan Bay, Masbate (all USNM). FORMOSA: Tainan beach (AMNH). RYUKYU ISLANDS: reef off Ogimi, Okinawa-Shima; Okinawa (both USNM); Batan reef, Okinawa (AMNH); Amami-Oshima (Powell coll.). JAPAN: Osima, Osumi (USNM). MARIANAS: Guam Island (Clover coll.). PALAU ISLANDS: Malk Island (USNM). MARSHALL ISLANDS: Lijerion I., Jaluit Atoll (USNM). NEW GUINEA: Siassi Island (Hoskin coll.); Nimoa Island, Calvados Chain; Port Moresby (both Kleckham coll.); N.E. end of Noekori I., E. Padoaido I. (Powell coll.). AUSTRALIA: Michaelmas Cay, Queensland (Powell coll.). NEW BRITAIN: Rabaul (AMNH; Kleckham coll.). SOLOMON ISLANDS: Gizo (Steiner coll.); Treasury Island; Lunga, Guadalcanal (both USNM); Marau Sound, Guadalcanal (Cernohorsky coll.). NEW HEBRIDES: Ambryon Islands (AIM); Pango reef, Efate I.; Bushmens Bay, Malekula I.; Ure I., opposite E. coast of Malekula I. (all Cernohorsky coll.). LOYALTY ISLANDS: Sandal Bay, Lifu; Les Jumeaux, Uvea (both USNM); Lifu (AIM). NEW CALEDONIA: Kuea Bay (USNM). FIJI ISLANDS: Cuvu beach, S. Viti Levu; Nadroga reef, S. Viti Levu (both Cernohorsky coll.). TONGA ISLANDS: (Garrett, 1850). SAMOA ISLANDS: (Garrett, 1850). NIUE ISLAND: Namoui (McDowall coll.; Cernohorsky coll.).

Mitra litterata Lamarck, 1811

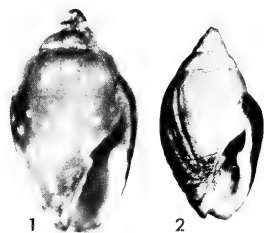
(Color pl. 258, figs. 9-11; pl. 433)

Range—Red Sea and Gulf of Oman to Polynesia and the Hawaiian Islands.

Remarks—This is one of the commonest and most widely distributed mitrid, which is so variable in form, colour-ornamentation and development of the outer lip callus, that several plates would be required in order to record all known variants.

Habitat—On reefs, under rocks and coral, in crevices of coral and among algae, in the intertidal zone. Kohn (1970), in a study of Hawaiian populations of the species, found that *M. litterata* preys exclusively on siphunculids which burrow in reef limestone.

Description—Shell up to 31 mm (about 1¼ inches) in length, elongate-ovate to ovate, heavy and solid, body whorl very long, spire short, sutures distinct and narrowly incised. Whorls 5-7, apart from the protoconch which is always eroded in mature specimens, spire whorls short and convex, sculptured with spiral rows of small and shallow punctures which number from 4-13 on the penultimate and from 17-30 on the body whorl; towards the base the spiral pittings become prominent, oblique cords. Aperture longer than the spire, narrow and smooth within, outer lip prominently thickened and smooth, interior callus small or large and sometimes bluntly triangular; columella calloused anteriorly and with 4-5 oblique folds, parietal wall only glazed and frequently with a callosity near the juncture of the outer lip. Siphonal canal short and straight, siphonal notch distinct. White or cream in colour, ornamented with irregular, wavy, brown or dark olive-green axial streaks and blotches, some specimens are brown and spotted and streaked with white, cream or light yellow; aperture and columella white or light violet, parietal wall brown, parietal

Plate 433. *Mitra (Strigatella) litterata* Lamarck.Fig. 1. Lectotype of *M. maculosa* Reeve (NMW; 17.7 x 10.0 mm).Fig. 2. Lectotype of *M. anais* Lesson from the Gambier Islands (MHNP; 31.0 mm) [photo courtesy of B. Salvat, MHNP].

callus off-white. Periostracum thin, brown or yellowish brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
31.0	—	—	Lectotype of <i>anais</i>
28.6	15.2	19.8	Lady Elliot I., Queensland
26.0	14.5	18.4	Cuvu beach, Fiji Ids.
22.7	14.2	15.4	Lectotype of <i>bizonalis</i>
20.0	10.7	13.5	Lectotype of <i>hebraea</i>
19.4	10.6	14.0	Port Louis, Mauritius
17.7	10.0	12.7	Lectotype of <i>maculosa</i>
13.6	7.5	9.6	Kahala, Hawaiian Ids.
10.5	6.0	8.0	Pango Point, New Hebrides

Synonymy—

- 1811 *Mitra litterata* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 220 (Indian Ocean); 1838 Kiener, *Spécies général iconographie coquilles vivantes*, vol. 3, p. 50, pl. 16, fig. 50; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 18, pl. 21, fig. 436; 1970 Kohn, *Pacific Science*, vol. 24, no. 4, p. 483.
- 1822 *Colombella bizonalis* Lamarck, Hist. nat. anim. s. vertèbres, vol. 7, p. 294 (no locality given); 1969 Cernohorsky, *Revue Suisse Zoologie*, vol. 76, p. 990, pl. 7, fig. 56 (figured lectotype).
- 1822 *Colombella hebraea* Lamarck, *ibid.*, p. 295 (no locality given); 1969 Cernohorsky, *ibid.*, p. 990, pl. 7, fig. 57 (figured lectotype).
- 1839 *Mitra leopardina* Küster, Syst. Conchylien-Cabinet, ed. 2, p. 99, pl. 17, figs. 4, 5 (no locality given).
- 1842 *Mitra anais* Lesson, *Revue Zool. Soc. Cuvier*, vol. 5, p. 142 (Gambier Islands).
- 1844 *Mitra literata* (sic) Lamarck, Reeve, *Conchologia Iconica*, vol. 2, pl. 20, fig. 153.
- 1844 *Mitra maculosa* Reeve, *ibid.*, pl. 22, fig. 175 and pl. 25, fig. 194 (Australia and Anaa I., Tuamotus); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 18, pl. 21, figs. 442, 443.
- 1880 *Strigatella litterata* Lamarck, Garrett, *Journal of Conchology*, vol. 3, p. 33; 1965 Cernohorsky, *Veliger*, vol. 8, p. 111, pl. 18, fig. 65; 1966, *Journal of Conchology*, vol. 26, p. 17, textfig. 2 (radula).
- 1880 *Strigatella maculosa* Reeve, Garrett, *ibid.*, p. 34.
- 1880 *Strigatella literata* (sic) Lamarck, von Martens, *Beitr. Meeresf. Mauritius & Seychellen*, p. 257.

1882 *Mitra (Strigatella) litterata* Lamarck, Tryon, *Manual Conchology*, vol. 4, p. 155, pl. 46, figs. 338, 339; 1970 Cernohorsky, *Bull. Auckland Inst. Museum*, no. 8, p. 14, textfig. 65 (radula).

1923 *Mitra (Strigatella) litterata* var. *minor* Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 145 (New Caledonia) [non Weinkauff, 1868].

1923 *Mitra (Strigatella) litterata* var. *major* Dautzenberg & Bouge, *ibid.*, p. 145 (New Caledonia) [non Grateloup, 1847].

1923 *Mitra (Strigatella) litterata* var. *inversicolor* Dautzenberg & Bouge, *ibid.*, p. 146 (Lifu, Loyalty Islands).

1923 *Mitra (Strigatella) litterata* var. *maculosa* Reeve, Dautzenberg & Bouge, *ibid.*, p. 145.

Types—The type-specimen of *M. litterata*, described from the Museum collection of the Muséum d'Histoire Naturelle, Paris, is no longer extant. The lectotype of *Colombella bizonalis* Lamarck, no. 1108/25 and *C. hebraea* Lamarck, no. 1108/26, are both in the Muséum d'Histoire Naturelle, Geneva. Two syntypes of *M. anais* Lesson, are in the Muséum National d'Histoire Naturelle, Paris, and the larger, 31.0 mm long syntype, is selected as the lectotype. The syntype of *M. maculosa* Reeve, illustrated in figure 194 on plate 25 of Reeve's "Conchologia Iconica", ex-Taylor collection, is in the National Museum of Wales, Cardiff, and is here selected as the lectotype of *M. maculosa*. The type locality is Indian Ocean, and this is further restricted to Mauritius (specimens in Powell coll.).

Records—RED SEA: Eilat, Gulf of Aqaba (Haim coll.; Hadar coll.; Powell coll.); (TAU); Ras Muhammad, Sinai Peninsula (TAU); Jidda (DMNH). GULF OF OMAN: Muscat, Oman (AMNH). EAST AFRICA: Mogadiscio, Somalia; Mboia Magi, Tanganyika (both USNM); Mocimbeque, Mozambique (USNM; AMNH); W. side of Inhaca I., Lorenzo Marques, Mozambique (Orr coll.); Nacala, Mozambique (Steiner coll.). ZANZIBAR: Pwani Mchangan (AIM). SOUTH AFRICA: Durban, Natal (Steiner coll.); Xora, Transkei coast (USNM); Reunion Rocks, 10 mi. S. of Durban, Natal (AMNH; Ackermann coll.). INDIAN OCEAN ISLANDS: Felicite I., Seychelles I. (USNM); Point aux Sables, 3 mi. S.W. of Port Louis, Mauritius (Powell coll.). THAILAND: Goh Phi Phi (USNM). INDONESIA: Sawarna, Bantam, Java; Keledjatan, Bantam, Java; Island W. shore of Veekens Bay, S. Pagi I. (all USNM). PHILIPPINE ISLANDS: Cabra I., Mindoro; Manila Bay (both USNM). FORMOSA: off Kao-Hsiung; Liu Chiu Chiao, between Penghu and Taiwan (both Steiner coll.); Tainan beach (AMNH). RYUKYU ISLANDS: Okinawa-Shima (USNM). MARIANAS: Hagman beach, Saipan (USNM); Aluput I., Agana Bay, Guam I. (AIM). MARSHALL ISLANDS: Bikini I., Bikini Atoll; Eniwetok Island; Enyvetok Rongerik Atoll; Ailuk I., Ailuk Atoll (all USNM). NEW GUINEA: Seleo I., off N.W. reef, Aitape (USNM); Port Moresby (Hinton coll.); Ambai, Japan I. (Powell coll.). AUSTRALIA: Point N. of Norwagien Bay, N.W. Australia, 22°34'S & 113°39'E; Point Cloates, N.W. Australia (both WAM); Lady Elliot I., Queensland (Powell coll.). NEW BRITAIN: Rabaul (Kleckham coll.). SOLOMON ISLANDS: Treasury Island (USNM); Savaotu, Guadalcanal (DMNH). LOYALTY ISLANDS: Lifu (USNM; AIM); Ilot Deguala, Uvea (USNM). NEW CALEDONIA: Hienghene; Nou Island (both USNM). NEW HEBRIDES: reef S. Uta, Aneityum; Black beach, Tanna I. (both USNM); Pango reef, Elate I. (AIM; DMNH); Ure I., opposite E. coast of Malekula I. (Cernohorsky coll.). FIJI ISLANDS: Cuvu beach, S. Viti Levu; Nadroga reef, S. Viti Levu (both Cernohorsky coll.). GILBERT & ELLICE ISLANDS: Nukulai, Ellice I.; Vaitupu, Ellice I.; Apamama, Gilbert I. (all USNM); Bikenibeu, Tarawa I., Gilbert I. (Foreman coll.). TONGA IS-

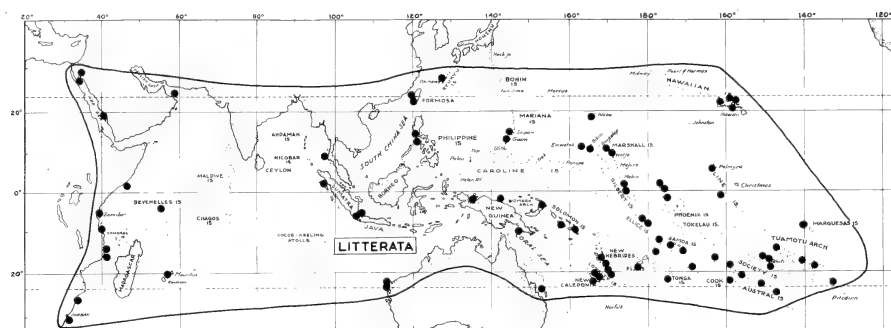


Plate 434. Geographical distribution of *Mitra (Strigatella) litterata* Lamarck.

LANDS: Hufagalupe, Tongatapu; Tukutonga reef, E. of Nuku'alofa (both USNM). **SAMOA ISLANDS:** Tutuila I.; Feliulupo Road, Savaii (both USNM). **NIUE ISLAND:** Alofi (USNM; Cernohorsky coll.). **WALLIS & FUTUNA ISLANDS:** W. side Anse de Sigave, Hoon I., Futuna I.; N. coast of Faioa, Wallis I. (both USNM). **TUBUAI ISLANDS:** Moera wharf, Rurutu; Motu Moturoa; Motu Veiamanu, Raevavae (all USNM). **LINE ISLANDS:** Jarvis Island (AIM); Fanning Island (DMNH); Palmyra Island (USNM; DMNH). **PHOENIX ISLANDS:** Canton Island (USNM; Leechman coll.). **HOWLAND ISLAND:** (USNM). **BAKER ISLAND:** (USNM). **COOK ISLANDS:** Palmerston Atoll (Steiner coll.); Mauke Island; Motu Akaiami, Aitutaki; Black Rock, Rarotonga; Palmerston Island (all USNM); Avatiu harbour, Rarotonga (USNM; Cernohorsky coll.); Avarua Harbour, Rarotonga (USNM; AIM). **SOCIETY ISLANDS:** Motu Fenuaina, Tautira, Tahiti; Motu Taiahu, Huahine; Tiarei, Tahiti; Ilot Tararuru-roa (all USNM). **TUAMOTU ISLANDS:** Mahemo Island, Vahitaki; Maia reef, Tikahau (all USNM). **GAMBIER ISLANDS:** (MHNP). **MARQUESAS ISLANDS:** Taiohae Bay, Nukuhiva (USNM). **HAWAIIAN ISLANDS:** Kahala, Oahu (Cernohorsky coll.); 5 mi. S.W. of Kapoho; Wainiui, Kauai (both USNM); Waialeale reef, Oahu (Clover coll.); Hanauma Bay, Oahu (Powell coll.); Niuhau Island; Diamond Head, Honolulu (both AIM). **WAKE ISLAND:** (AMNH; DMNH).

***Mitra auriculoides* Reeve, 1845**

(Color pl. 258, figs. 12, 13; pl. 435)

Range—Mauritius to Polynesia.

Remarks—This species has been confused with *M. auriculoides* of authors, a species which will have to bear the name *M. assimilis* Pease. *M. auriculoides* Reeve, a rare species, is squatter and broader than *M. assimilis*; the body whorl is shorter and the outer lip has a prominent, more or less triangular interior callosity and a smooth outer lip margin, apart from 2-4 rather obsolete denticles anteriorly. Reeve's species has probably been based on the Indian Ocean form of the

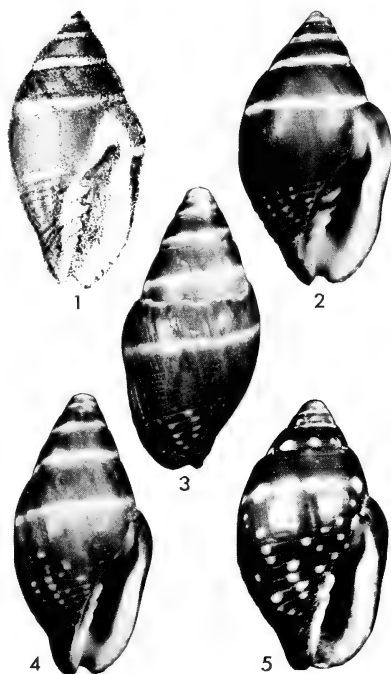


Plate 435. *Mitra (Strigatella) auriculoides* Reeve.

Fig. 1. Lectotype figure of *M. (S.) auriculoides* Reeve (from Reeve, 1845, pl. 28, fig. 228).

Fig. 2. Specimen from Mauritius; broad form (WABP coll.; 18.4 x 9.0 mm).

Figs. 3, 4. Specimen from Mauritius; slender form (WABP coll.; 16.6 x 9.4 mm).

Fig. 5. Specimen from Noumea, New Caledonia; colour form *turturina* Souverbie (WOC coll.; 14.0 x 7.8 mm).

species, which has a dark brown shell with white spiral lines which have only a very slight indication of being spotted with white; the anterior part of the body whorl has only a minimum of small white spots. In the Pacific Ocean form *turturina* Soubervie, the white spiral lines become faint and are overlaid by more prominent, white or yellowish spots and the anterior part of the body whorl is prominently spotted. *M. auriculoides* and *M. assimilis* are sympatric in several Indo-Pacific localities without any intergrades having been encountered. The difference in apertural features between the two species are of the same magnitude as between *M. litterata* and *M. retusa*. *M. auriculoides* has a smooth outer lip, whereas *M. assimilis* has an outer lip that is minutely denticulate along its entire length.

Habitat—On reefs, on rocks and coral, in the intertidal zone.

Description—Shell up to 20 mm (about ¾ inches) in length, rather ovate and solid, body whorl moderately long, sutures distinct but narrowly incised. Whorls 5-6, apart from 1½-2 cream-coloured, smooth nuclear whorls, spire whorls regularly convex, sculptured with finely punctate spiral striae which number from 3-6 on the penultimate and from 5-14 on the body whorl, apart from the 8-11 oblique basal cords; in some specimens the spiral striae are confined to the shoulder of the body whorl, the centre is smooth and then the cords continue towards the base. Aperture longer than the spire, very narrow and smooth within, outer lip prominently thickened, smooth apart from 2-3 weak crenulations anteriorly, outer lip with a prominent, bluntly triangular and moderately long callus. Columella concave, with a weak callus-shield anteriorly and 4 or 5 prominent, oblique folds, parietal wall only glazed and posteriorly with a calloused ridge or pad; siphonal fasciole short and straight, siphonal notch moderately shallow. Fresh specimens are dark brown or reddish-brown in colour, ornamented with a pale, whitish or yellowish spiral band which usually has superimposed small white spots; on the spire whorls this band adjoins the sutures while on the body whorl it is in line with the start of the aperture; on the lower two-thirds of the body whorl are few or moderately numerous small white spots distributed at random or sometimes longitudinally aligned. The aperture and columellar folds are bluish-white or light violet and the parietal wall is brown. The peristomum is thin, orange-brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
18.6	9.2	11.4	Mauritius
16.0	8.6	10.8	Pango reef, New Hebrides
15.0	8.9	10.5	Natadola, Fiji I.
12.0	7.0	8.0	Type-specimen of <i>turturina</i>
11.0	6.5	7.9	Lifu, Loyalty Ids.

Synonymy—

- 1838 *Mitra unifascialis* Kiener, *Spécies général iconographie coquilles vivantes*, vol. 3, p. 53, pl. 16, fig. 51 (no locality given) [non *M. unifascialis* Lamarck, 1811].
 1839 *Mitra nivosa* Küster, *Syst. Conchylien-Cabinet*, ed. 2, vol. 5, p. 100, pl. 17, figs. 16, 17 (no locality given) [non *M. nivosa* Swainson, 1822].
 1845 *Mitra auriculoides* Reeve, *Conchologia Iconica*, vol. 2, pl. 28, fig. 228 (no locality given).
 1859 *Columbella unifascialis* Chenu, *Manuel de Conchyliologie*, vol. 1, p. 203, textfig. 1105 (non Lamarck, 1822).
 1875 *Mitra turturina* Soubervie, *Journal de Conchyliologie*, vol. 23, p. 43 (Lifu, Loyalty Islands); 1877, *Journal de Conchyliologie*, vol. 25, p. 73, pl. 1, fig. 2.
 1882 *Mitra (Pusia) turturina* Soubervie, *Tryon, Manual Conchology*, vol. 4, p. 184, pl. 55, fig. 584; 1896 Melvill & Standen, *Journal of Conchology*, vol. 8, p. 406.
 1923 *Mitra (Strigatella) turturina* Soubervie, *Dautzenberg & Bouge, Journal de Conchyliologie*, vol. 67, p. 154; 1933, *Journal de Conchyliologie*, vol. 77, p. 195.
 1965 *Strigatella turturina* (Soubervie), Cernohorsky, *Veliger*, vol. 8, p. 114, pl. 18, fig. 62.

Types—The type specimen of *M. auriculoides* Reeve, has been sold at auction of the Norris collection, and we designate the specimen illustrated by Reeve on plate 28, figure 228 of the "Conchologia Iconica" as the lectotype of *M. auriculoides*. The two syntypes of *M. turturina* Soubervie, are in the Muséum d'Histoire Naturelle, Bordeaux; the current whereabouts of the type-specimen of *M. nivosa* Küster (non Swainson), which used to be in the collection of the Duke of Gotha, are unknown. The type-specimen of *M. unifascialis* Kiener (non Lamarck), is in the Museum d'Histoire Naturelle, Geneva; the specimen is the same Indian Ocean form as Reeve's *M. auriculoides*. No locality was given by Reeve, but specimens from Mauritius very closely match Reeve's illustration, and Mauritius is designated as the type locality.

Records—MAURITIUS: (Powell coll.; MCZ). REUNION: (MCZ). NEW HEBRIDES: E. of Inyeng I., Anceyem; Black beach, Tanna I. (both USNM); Pango reef, Efate I.; Ure I., opposite E. coast of Malekula I. (both Cernohorsky coll.). LOYALTY ISLANDS: Lifu Island (USNM); AIM; Cernohorsky coll.). FIJI ISLANDS: Natadola, S.W. Viti Levu (Cernohorsky coll.). SOCIETY ISLANDS: (Dautzenberg & Bouge, 1923, 1933). MARQUESAS ISLANDS: Haka Bay, Nukuhiva (USNM). LINE ISLANDS: Fanning I. (DMNH).

***Mitra assimilis* Pease, 1868**

(Color pl. 258, figs. 14-16; pl. 436)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—This species is the *M. auriculoides* of authors but not of Reeve, and differs from *M. auriculoides* in its longer body whorl, more slender and usually more cylindrical form, slight constriction near the siphonal canal, less inflated body whorl, weak interior callus on the outer lip, and the margin of the outer lip is minutely crenulated along its entire length. In *M. assimilis*, the white presutural band on the body whorl erupts into a large, smudged blotch on the back of the outer lip, a feature not observed in *M. auriculoides*.

Habitat—On reefs, under rocks and coral, in the intertidal zone.

Description—Shell up to 25.0 mm (1 inch) in length, variable in form, elongate-ovate to cylindrically-ovate, spire occasionally acuminate but generally blunted through the erosion of the spire whorls, spire short, sutures distinct but narrowly incised. Whorls 5-6, apart from an eroded protoconch, spire whorls regularly convex, sculptured with very fine, shallow and minutely pitted spiral lines or grooves which number from 4-7 on the penultimate and from 10-25 on the body whorl, apart from 8-12 weak, oblique cords at the base; in many individuals the spiral grooves become obsolete on the centre of the body whorl, while in some small, mature specimens the spiral

grooves may be deeper and produce weak spiral threads; under magnification, fine, longitudinal hair-lines are discernible. Aperture longer than the spire, very narrow and smooth within, outer lip thickened, concave near the start and swelling into the aperture, callus weak and appreciably less prominent than in *M. auriculoides*, margin of outer lip with 8-15 small crenulations which extend from the interior callus to the base. Columella calloused anteriorly and with 4-5 oblique folds, parietal wall only glazed and posteriorly with a weak callus or calloused denticles; siphonal canal short and straight, siphonal notch moderately distinct. Reddish-brown to chestnut-brown in colour, ornamented with either a narrow or moderately broad, white or yellowish spiral band anteriorly to the suture on the body whorl, and a single, interrupted band of the same colour adjoining sutures on the spire whorls; this spiral band is frequently blotched with white or pale yellow, and on the lower half of the body whorl are small, white spots. On reaching the back of the aperture, the peripheral band on the body whorl erupts into an irregular and somewhat smudged blotch which extends upward from the band. Aperture, anterior columellar callus, folds and parietal thickening white, bluish white or light violet, parietal wall brown. Periostracum thin, orange-brown and moderately translucent.

Measurements (mm)—

length	width	height of aperture	
24.4	12.4	15.6	Honolulu, Hawaiian Ids.
23.0	10.5	14.2	Port Aneityum, New Hebrides
21.6	10.0	13.7	Momi, Fiji I.
16.8	6.9	9.4	Lectotype of <i>assimilis</i>
13.0	6.8	8.0	Society Islands
11.0	4.9	6.9	Nukuhiva, Marquesas Ids.

Synonymy—

- Mitra auriculoides* of authors (non Reeve, 1845).
 1868 *Mitra assimilis* Pease, American Journ. Conchology, vol. 3, p. 211, pl. 15, fig. 1 (Polynesia).
 1874 *Mitra auriculoides* (pars) Reeve, Sowerby, Thesaurus Conchylorum, vol. 4, p. 18, pl. 21, fig. 440 only (non Reeve, 1845).
 1880 *Strigatella auriculoides* Reeve, Garrett, Journal of Conchology, vol. 3, p. 32; 1965 Cernohorsky, Veliger, vol. 8, p. 109, pl. 18, fig. 61; 1966, Veliger, vol. 9, p. 107, textfig. 10 (radula) [non *M. auriculoides* Reeve, 1845].
 1882 *Mitra (Chrysame) coronata* (pars) Lamarck, Tryon, Manual Conchology, vol. 4, p. 148, pl. 44, fig. 281 only (non Lamarck, 1811).

Types—The two syntypes of *M. assimilis* Pease, are in the Academy of Natural Sciences, Philadel-

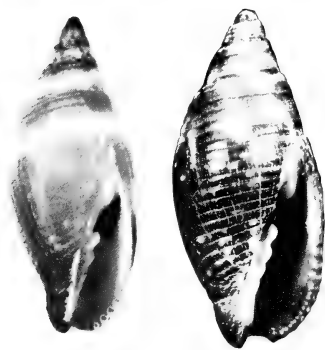


Plate 436. *Mitra (Strigatella) assimilis* Pease.

Fig. 1. Lectotype from Polynesia (ANSP 28718; 16.8 x 6.9 mm).

Fig. 2. Specimen from Taiohae Bay, Nukuhiva, Marquesas Ids. (USNM; 11.0 x 5.0 mm).

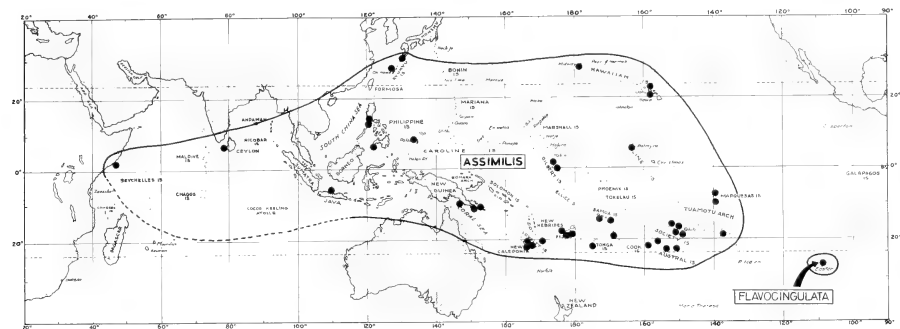


Plate 437. Geographical distribution of the species *Mitra (Strigatella) assimilis* Pease, and *M. (S.) flavocingulata* Lamy.

Mitra flavocingulata Lamy, 1938

(Pl. 438)

phia, no. 28718; the larger, 16.8 mm long specimen, which was illustrated by Pease, is here designated as the lectotype. The type locality is Polynesia, and this is further restricted to Huahine Island, Society Islands (specimens in USNM).

Nomenclature—The species has been confused with *M. auriculoides* Reeve, a similar but squatter and more ovate species with a prominent denticle within the outer lip and a smooth margin. *M. assimilis* Pease, was based on an atypical specimen with a slightly longer spire, slightly deeper spiral grooves and a weaker outer lip callosity.

Records—EAST AFRICA: Mogadiscio, Somalia (USNM). CEYLON: (USNM). INDONESIA: Java (USNM). PHILIPPINE ISLANDS: Caba I., Lubang I., Mindoro; Manila Bay, Luzon (both USNM); Santa Cruz, Zamboanga (Dan coll.). RYUKYU ISLANDS: (USNM). JAPAN: Ōshima, Ōsumi (USNM). PALAU ISLANDS (USNM). NEW GUINEA: Tagula I., Calvados Chain (Hoskin coll.); Samarai Island; Port Moresby (both Kleckham coll.). NEW HEBRIDES: Port Annetuy (USNM). LOYALTY ISLANDS: Isle Longue, Uvea (USNM); Lifu (AIM). NEW CALEDONIA: Kuea Bay (USNM). FIJI ISLANDS: Natadola, S.W. Viti Levu (Bean coll.); Suva reef, S. Viti Levu (Browne coll.); Momi, W. Viti Levu (Cernohorsky). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.). SAMOA ISLANDS: Ofu, Manu'a group; Matautu, Lefaga Bay, Upolu (both USNM). GILBERT ISLANDS: Apamama; Onotoka Atoll (both USNM); Bikenibeu, Tarawa I. (Foreman coll.). NIUE ISLAND: (McDowall coll.). COOK ISLANDS: Mauke Island; Avatiu Harbour, Rarotonga (both USNM). LINE ISLANDS: Palmyra Island (USNM). TUBUAI ISLANDS: Rimatara; Moera, Rurutu (both USNM). SOCIETY ISLANDS: Raiatea Island (Deynzer coll.); Point Teffaa, Huahine; Port du Bourayne, Huahine; Moorea Island; E. side of Taunoa Pass, Tahiti; Motu Iriru, Raiatea (all USNM). TUAMOTU ISLANDS: Vahitaki (USNM). MARQUESAS ISLANDS: Taiohae Bay, Nukuhiva (USNM); Tahuata Island (USNM; Clover coll.). HAWAIIAN ISLANDS: Mokulea reef, Oahu; Waialea reef, Oahu (both Leeham coll.); Honolulu (ZMC; Del Mus. N.H.); Kewalo, Honolulu; Quarantine I., Honolulu (both USNM). MIDWAY ISLANDS: (USNM).

Range—Easter Island, Southeast Pacific Ocean.

Remarks—The species is endemic to Easter Island. It is closely related to *Mitra assimilis* Pease, in form and sculpture, and differs primarily in colour ornamentation and obsolete crenulations on the outer lip.

Habitat—Intertidal, in tide pools.

Description—Shell up to 29 mm (1¼ inches) in length, solid, cylindrically elongate-ovate, sutures impressed but narrowly incised. Whorls 5, apart from eroded protoconch, spire whorls regularly convex, sculptured with fine and shallow, minutely punctate spiral striae which in specimens examined numbered from 3-7 on the penultimate and from 4-9 on the body whorl, apart from 3-4 punctate spirals and 4 or 5 flattish spiral cords near the base; occasional individuals have longitudinal striae on spire whorls and the sutural area of the body whorl. Aperture longer than the spire, narrow but widening basally, interior smooth; outer lip prominently thickened, slightly constricted at posterior third and weakly calloused on the interior, margin of outer lip with obsolete and ill-defined crenulations. Columella calloused anteriorly and with 4-5 strong, oblique folds, parietal wall only glazed but with a callosity posteriorly in mature specimens; siphonal canal short and straight, siphonal notch distinct. Orange-tan in colour, ornamented with dark brown narrow spiral bands and a slightly broader yellowish band anteriorly to the sutures, back of outer lip usually lighter in colour; the aperture, columella and parietal callus are white or

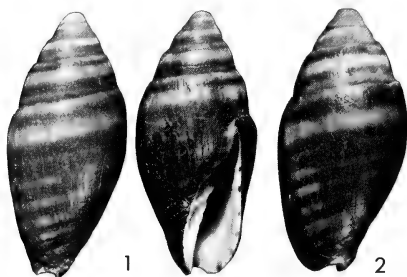
Plate 438. *Mitra (Strigatella) flavocingulata* Lamy.

Fig. 1. Lectotype from Easter I., Pacific Ocean (MHNP; 25.1 x 11.6 mm).

Fig. 2. Paralectotype from Easter I., Pacific Ocean (MHNP; 25.3 x 12.4 mm) [photo courtesy of B. Métivier, MHNP].

bluish-white, parietal wall brown. Periostracum thin, dark brown and longitudinally striate.

Measurements (mm)—

length	width	height of aperture	
28.7	12.9	17.5	Hanga Piko, Easter I.
25.1	11.6	14.5	Lectotype of <i>flavocingulata</i>
25.0	11.9	15.7	Holotype of <i>rapanuensis</i>
23.8	11.2	13.3	Paralectotype of <i>flavocingulata</i>
20.8	9.8	12.2	Easter I.

Synonymy—

1938 *Mitra (Strigatella) amphorella* var. *flavo-cingulata* Lamy, Journ. de Conchyliologie, vol. 82, no. 2, p. 135 (Easter I. and Anakena Bay, Easter I.)

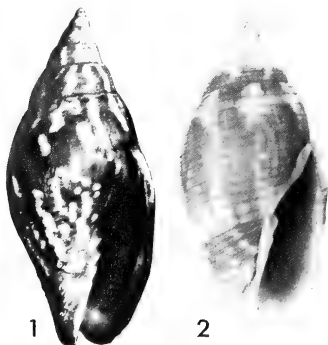
Plate 439. *Mitra (Strigatella) scutulata* (Gmelin).

Fig. 1. Holotype from the "East Indies" (ZMO; 38.0 mm) [colour slide courtesy of R. Tucker Abbott, DMNH].

Fig. 2. Holotype of *M. nebias* Melvill from Aden; broad form (BM (NH) 1895.5.28.1; 26.2 x 12.4 mm).

1968 *Strigatella rapanuensis* J. Cate, Veliger, vol. 11, no. 2, p. 87, pl. 11, figs. 4a, b (Easter I., Pacific Ocean).

Types—The lectotype and 3 paralectotypes of *M. flavocingulata* Lamy (here designated), are in the Museum National d'Histoire Naturelle, Paris, and the holotype of *M. rapanuensis* (J. Cate) is in the Department of Geology, California Academy of Sciences, San Francisco, no. 13103. The type locality is Easter Island, Southeast Pacific Ocean.

Records—EASTER ISLAND: (MHNP; CAS); Anakena Bay (MHNP); Hanga Piko (USNM).

Mitra scutulata (Gmelin, 1791)

(Color pl. 258, figs. 17-20; pl. 439)

Range—Gulf of Aden to India and Polynesia.

Remarks—The species is common in the centre of its distributional range, but is rare in the western Indian Ocean and the South Pacific. It is variable in colour, being blackish-brown with white axial stripes or a pale subsutural zone on the body whorl; some individuals lack ornamentation altogether. The banded colour form has been described as *M. amphorella* Lamarck.

Habitat—On reefs, under rocks and coral, from the intertidal zone to a depth of 3 fathoms.

Description—Shell up to 47.0 mm (about 2 inches) in length, heavy and solid, elongate-ovate and often inflated, sutures distinct but narrowly incised. Whorls 6-7, apart from a protoconch of 2 light brown, smooth nuclear whorls, spire whorls distinctly convex, last whorl usually inflated, sculptured with narrowly incised spiral grooves which usually produce feebly elevated cords which number from 2-8 on the penultimate and from 5-15 on the body whorl; in most specimens, however, the body whorl has only up to half a dozen spiral threads at the shoulder, the centre of the whorl is smooth and the lower third has oblique spiral cords. Under magnification very fine axial striae are visible. Aperture usually longer than the spire, moderately wide and smooth within, outer lip convex or sometimes subangulate anteriorly and weakly constricted posteriorly, interior callus weak in most specimens, margin of outer lip thickened and smooth, or with weak traces of a few denticles anteriorly. Columella calloused anteriorly, and with 4-5 prominent, oblique folds, parietal wall only glazed but posteriorly with a small white callus pad in adult specimens; siphonal fasciole straight, occasionally weakly calloused, siphonal notch

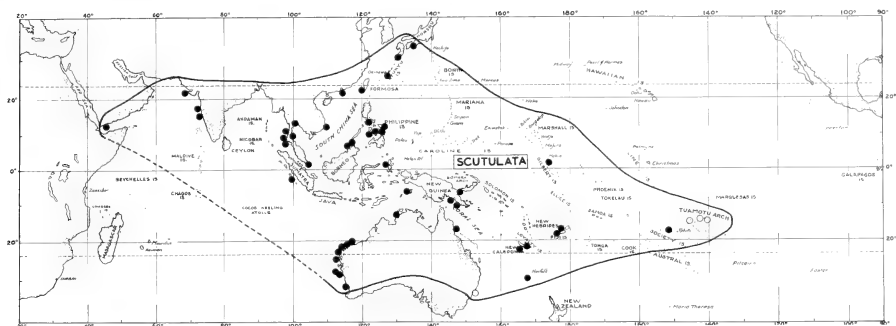


Plate 440. Geographical distribution of *Mitra* (*Strigatella*) *scutulata* (Gmelin).

very prominent. Chestnut-brown to blackish-brown in colour, ornamented with narrow, wavy white axial stripes which are usually interrupted centrally or may be continuous, and are broken up into small spots towards the base; in some individuals the axial stripes are replaced by a narrow or broad, faint or distinct, orange-brown or white subsutural band, while a few rare individuals lack all kinds of ornamentation. Aperture and columellar folds white or bluish-white, occasionally flushed with light brown, parietal wall brown. Periostracum thin, brown and translucent.

Measurements (mm)—

length	width	height of aperture	
41.0	17.4	25.0	Vuda Point, Fiji I.
38.4	16.2	18.4	Probable holotype of <i>limbifera</i>
38.0	—	—	Holotype of <i>scutulata</i>
31.0	13.2	19.2	Balabac I., Philippines
26.2	12.4	16.1	Holotype of <i>nebrias</i>
25.3	12.1	16.1	Holotype of <i>amphorella</i>
22.0	10.2	13.8	Phuket I., Thailand

Synonymy—

- 1788 "*Voluta scutulata*" Chemnitz, Syst. Conchylien-Cabinet, vol. 10, p. 168, pl. 151, figs. 1428, 1429 (non binomial).
- 1791 *Voluta scutulata* Gmelin, Systema Naturae, ed. 13, p. 3452 (refers to Chemnitz, *op. cit.*, figs. 1428, 1429) [Indian Ocean]; 1967 Cernohorsky, Journal of Conchology, vol. 26, p. 164.
- 1798 *Mitra discolor* Röding, Museum Boltenianum, p. 137 (refers to Chemnitz, *op. cit.*, figs. 1428, 1429) [no locality given].
- 1801 *Mitra scutellata* Bosc, Hist. nat. coquilles, vol. 5, p. 48 (refers to Chemnitz, *op. cit.*, fig. 1428) [Indian Ocean].
- 1811 *Mitra amphorella* Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 214 (no locality given); 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 57, pl. 17, fig. 57; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 12, figs. 85a, b; 1880 Garrett, Journal of Conchology, vol. 3, p. 10; 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 976, pl. 5, fig. 34 (figured holotype).

1811 *Mitra limbifera* (Lamarck, Ann. Mus. d'Hist. Nat. Paris, vol. 17, p. 214 (no locality given); 1969 Cernohorsky, Revue Suisse Zoologie, vol. 76, p. 975, pl. 4, fig. 32 (figured probable holotype).

1822 *Mitra scutulata* (Gmelin), Lamarck, Hist. nat. anim. s. vertèbres, vol. 7, p. 314; 1838 Kiener, Species général iconographie coquilles vivantes, vol. 3, p. 64, pl. 1u, fig. 56; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 12, fig. 82; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 18, pl. 21, figs. 430-432; 1891 E. A. Smith, Proc. Zool. Soc. London, p. 410; 1951 Laserson, Rec. Austral. Museum, vol. 22, no. 4, p. 335; 1852 *Mitra sertum* Duval, Journal de Conchyliologie, vol. 3, p. 160, pl. 7, fig. 1 (? Marquesas Islands).

1882 *Mitra* (*Strigatella*) *scutulata* Lamarck, Tryon, Manual Conchology, vol. 4, p. 155, pl. 46, figs. 332-334, 337 only; 1933 Dautzenberg & Bouge, Journal de Conchyliologie, vol. 77, p. 189; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 14, textfig. 69 (radula).

1895 *Mitra* (*Strigatella*) *nebrias* Melvill, Proc. Malac. Soc. London, vol. 1, pt. 5, p. 222, pl. 14, fig. 4 (Aden).

1935 *Strigatella scutulata* (Gmelin), Dautzenberg, Mem. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 115 (extended synonymy); 1943 Habe, Venus: Jap. Journ. Malacology, vol. 13, p. 76, pl. 4, fig. 4 (radula); 1965 Cernohorsky, Veliger, vol. 8, p. 114, fig. 58; 1971 Wilson & Gillett, Australian Shells, p. 118, pl. 76, fig. 10.

Types—The holotype of *M. scutulata* (Gmelin), is in the Zoological Museum, Copenhagen. The holotype of *M. amphorella* Lamarck, no. 1107/99, and the probable holotype of *M. limbifera* Lamarck, no. 1108/11, are in the Muséum d'Histoire Naturelle, Geneva. The holotype of *M. nebrias* Melvill, is in the British Museum (NH) no. 1895.5.28.1; the whereabouts of the type-specimen of *M. sertum* Duval, are unknown. The type locality was given as Indian Ocean by Gmelin, and the holotype of *M. scutulata* came from the East Indies according to Chemnitz, and we therefore designate Borneo, Indonesia, as the type locality (specimens in USNM).

Records—GULF OF ADEN: (BMNH; NMW; E. A. Smith, 1891). INDIA: Goa (USNM); Dwarka, Gujerat; Ratnagiri, Maharashtra (both AMNH). THAILAND: Taluei Island; reef at airport beach, Koh Phuket; Angtong Island (all USNM); Ko-Phai, Gulf of Thailand (Steiner coll.); S.W. side of Phuket

L., w. coast of Thailand; Ko Ra Dang I., near Malayan border; Ko Samui I., w. side of the Gulf of Suratani (all Orr coll.; Cernohorsky coll.). MALAYSIA: N.E. coast of St. John's I., S. of Singapore (USNM). VIETNAM: Nhatrang Bay, Canda (ZMC). INDONESIA: Mandi Darrah I., N. Borneo; Mega, Mentawai I., S.W. of Sumatra; Sapi I., Jesselton, N. Borneo (all USNM); Tg Lelar, S.W. Trangran, Aru I., 6°46'S & 134°02'E; N. side of Teluk Dodinga, near Ternate, Halmahera (both WAM). PHILIPPINE ISLANDS: Mactan I., Cebu; Guijulan, Negros (both USNM); Boac, Marinduque (Lumawig coll.); Samar Island (Steiner coll.); Leyte (Clover coll.); Balabac Island (Cernohorsky coll.). CHINA: Hongkong (AIM). FORMOSA: S.W. Taiwan (Steiner coll.). RYUKYU ISLANDS: Okinawa (USNM). JAPAN: Osima, Osumi; Tanabe, Kii (both USNM). NEW GUINEA: Yule Island; Barakau (both Hinton coll.); Taurama reef, Port Moresby (Kleckham coll.). NEW BRITAIN: Arawe Island (Hinton coll.). AUSTRALIA: West Australia; Pelsart I., off Geraldton (USNM; Powell coll.); Abrolhos Islands (USNM); Point Quobba; Barrow Island; between Cape Dupuy and Cape Malouet; E. of Cape Poivre, 20°53'S & 115°20'E; mouth of Biggada Creek, 20°48'S & 115°21'E; N. of Point, Rottne Island; 16 mi. S. of Point Cloates; Cocatoo I., Yampi Sound; Thevenard I., off Onslow; Wooded I., Abrolhos Ids.; Eaglehawk I., Dampier Archipelago (all WAM); Queensland: Peppy beach, Trinity Bay (AIM); Bingli Bay (Powell coll.). New South Wales: Lascero, 1951). NORFOLK ISLAND: (Powell coll.). LOYALTY ISLANDS: Lifu (USNM). NEW CALEDONIA: Konebuni Island (USNM); Noumea (AMNH). FIJI ISLANDS: Manava I., N. Viti Levu; Vuda Point, W. Viti Levu (both Cernohorsky coll.). GILBERT ISLANDS: Bikenibeu, Tarawa I. (Foreman coll.). SOCIETY ISLANDS: Raiatea Island (IRS). TUAMOTU ISLANDS: (Garrett, 1880); Apataki Island; Napuka Island (both Dautzenberg & Bouge, 1933).

Mitra decurtata Reeve, 1844

(Color pl. 258, figs. 21, 22; pl. 441, fig. 1)

Range—Cocos-Keeling Islands and Indonesia to Polynesia.

Remarks—The centre of distribution of this uncommon species appears to be Micronesia, and the species rarity increases west and south of this region. We have not seen actual specimens east of Niue Island in the Pacific, but Dautzenberg and Bouge (1933) report the species from several localities in the Tuamotus. The species has been confused with *M. scutulata* (Gmelin) and *M. colombelliformis* Kiener. From the former species it differs prominently in form, the gibbous and calloused outer lip, and from the latter in being almost black in colour and ornamented with 1 or 2 narrow, spotted bands.

Habitat—On reefs, under coral, rocks and in crevices, in the intertidal zone.

Description—Shell up to 37.0 mm (1½ inches) in length, heavy and solid, ovate, sutures distinct, irregular and narrowly incised, spire short. Whorls 5, apart from the protoconch, spire whorls convex but usually eroded up to the penultimate or antepenultimate whorls, last 2 whorls smooth apart from obsolete spiral striae, macroscopic longitudinal hair-lines and distinct cords on the lower half of the body whorl. Aperture longer than

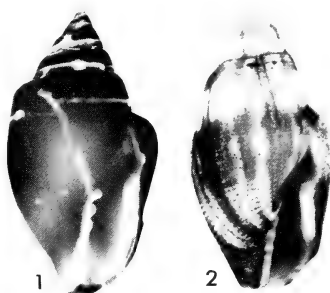


Plate 441. Fig. 1. *Mitra (Strigatella) decurtata* Reeve. Lectotype (BM NH) 1967744; 35.2 x 18.6 mm).

Fig. 2. Holotype of *M. (S.) colombelliformis* Kiener from "Madagascar" (MHNG 1108/4; 34.8 x 17.0 mm).

the spire, narrow and smooth within, outer lip gibbous and angulate near the start, greatly thickened, margin smooth, interior of lip prominently calloused. Columella concave, calloused, and with 4-5 prominent and curved folds, posterior of parietal wall with a white callosity, siphonal fasciole short and slightly angled towards the aperture, siphonal notch distinct. Almost black in colour, ornamented with 1 or 2 very narrow, orange, pale yellow or white bands on the body whorl; the narrow bands are brighter in parts, giving the band the impression of being spotted. The parietal wall is brown and the aperture, columellar folds and parietal callosity are bluish white. The periostracum is moderately thin, orange-brown, longitudinally striate and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
35.2	18.6	23.9	Lectotype of <i>decurtata</i>
30.2	17.2	21.2	Niue Island
28.9	16.0	20.0	Formosa
26.3	14.6	18.7	off Cababan, Philippines
23.8	12.8	16.9	Pango Pt., New Hebrides
21.0	11.8	15.4	Guadalcanal, Solomon Ids.

Synonymy—

1844 *Mitra decurtata* Reeve, *Conchologia Iconica*, vol. 2, pl. 20, fig. 154 (no locality given); 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 18, pl. 21, fig. 460.

1882 *Mitra (Strigatella) scutulata (pars)* Lamarck, *Tryon*, *Manual Conchology*, vol. 4, p. 155, pl. 46, fig. 335 only (non *Voluta scutulata* Gmelin, 1791).

1923 *Mitra (Strigatella) decurtata* Reeve, Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 143; 1933, *Journal de Conchyliologie*, vol. 77, p. 164; 1959 Kira, *Col. Illust. shells of Japan*, vol. 1, p. 67, pl. 33, fig. 9; 1970 Cernohorsky, *Rec. Auckland Inst. Museum*, vol. 7, p. 182, fig. 2

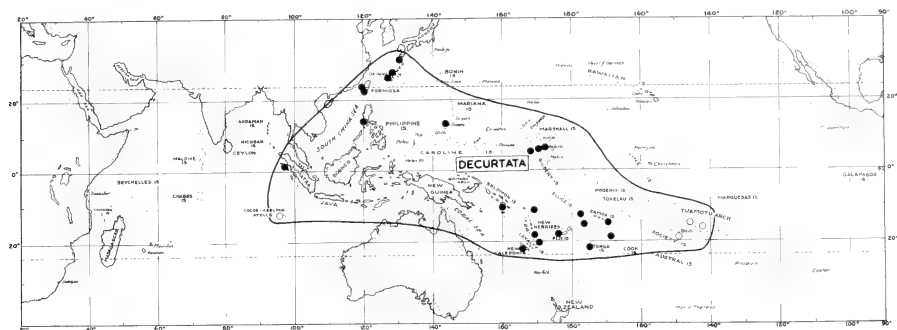


Plate 442. Geographical distribution of *Mitra (Strigatella) decurtata* Reeve.

(radula); 1970, Bull. Auckland Inst. Museum, no. 8, p. 72, pl. 4, fig. 2.

1967 *Mitra (Strigatella) colombelliformis* Kiener, Orr Maes, Proc. Acad. Nat. Sci. Philadelphia, vol. 119, no. 4, p. 139 (refers to Kira, 1959, pl. 33, fig. 9 = *M. decurtata* Reeve) [non *M. colombelliformis* Kiener, 1838].

Types—Three syntypes of *M. decurtata* Reeve, are in the British Museum (NH) no. 1967744; the largest specimen with an oblique fracture on the body whorl, length 35.2 mm, is here selected as the lectotype of the species. No locality was given by Reeve, and we designate Bataaan, Luzon, Philippine Islands, as the type locality.

Records—COCOS-KEELING ISLANDS: Direction Island (Orr Maes, 1967). INDONESIA: Mentawai I., Pulau Stupai, S. W. of Sumatra (USNM). PHILIPPINE ISLANDS: off coast of Cababalan, Bataan, Luzon (Deynzer coll.; Cernohorsky coll.); Albay Prov., Luzon (DMNH). FORMOSA: off Kao-Hsiung, Liu Chiu Chiao, between Penghu and Taiwan (both Steiner coll.); near Hung Tou Tsung (USNM). RYUKYU ISLANDS: Ohishima, Okinawa; Ukibara-shima, E. of Okinawa (both USNM). JAPAN: Osima, Osumi (USNM). MARIANAS: Oca Point, Guam I. (USNM). MARSHALL ISLANDS: Uliga I., Majuro Atoll; lagoon reef, E. of Bikonele, Aro Atoll; between Sidneytown and watchhouse, S. of Jabor, Jaluit Atoll (all USNM). SOLOMON ISLANDS: Ticopia Island (Powell coll.); N.W. coast of Guadalcanal (Cernohorsky coll.). HEW HEBRIDES: S.E. of Iuyeng I., Aneityum; Tjipthav, Aneityum (both USNM); Pango Point, Efate I. (Cernohorsky coll.). NEW CALEDONIA: Kuea Bay, Nan Island (both USNM). FIJI ISLANDS: Yewalu reef, N.W. of Lantoka, W. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.). SAMOA ISLANDS: Olu, Manu'a group (USNM). WALLIS & FUTUNA ISLANDS: Anse de Sigave, Hoom I., Futuna I.; Nukuhifala, Wallis I. (both USNM). NIUE ISLAND: Oneone reef, (McDowall coll.; Cernohorsky coll.); Avatele (USNM). SOCIETY ISLANDS: Tahiti (Dautzenberg & Bouge, 1933). TUAMOTU ISLANDS: Apataki; Makemo; Fakahina (all Dautzenberg & Bouge, 1933).

***Mitra colombelliformis* Kiener, 1838**

(Color pl. 258, figs. 23-25; pl. 441, fig. 2)

Range—Cocos-Keeling Islands, Indian Ocean to Polynesia.

Remarks—The species is similar in form to *M. decurtata* Reeve, with which species it is sympatric in several localities, but differs in features of a more elevated spire, regularly convex body whorl, crisper spiral sculpture and colouring. The specific name has been emended to “*columbelliformis*” and “*columbellaeformis*”, but Kiener’s original spelling, not being a slip of the pen, must be retained in its original form.

Habitat—On reefs, under rocks and coral, in the intertidal zone.

Description—Shell up to 40 mm (about 1½ inches) in length, heavy and solid, elongate-ovate and broad, spire pointed, sutures distinct and narrowly incised. Whorls 5-6, apart from an eroded protoconch, spire-whorls flat-sided, sculptured with finely axially striate spiral grooves which give rise to slightly elevated spiral threads, which number from 5-9 on the penultimate and from 12-22 on the body whorl, apart from 10-14 oblique cords at the base; the spiral threads weaken slightly on the centre of the body whorl, and the basal cords are more prominent. Aperture equal in height or longer than the spire, narrow and smooth within, outer lip greatly thickened, gibbous at the start, constricted posteriorly and prominently callosed within, margin of lip smooth. Columella thinly glazed, and with 5 or 6 prominent, oblique folds, parietal wall thinly glazed, siphonal canal straight and thick, siphonal notch prominent. Light olive-brown in colour, ornamented with broad, white or creamy-white axial zones which form a broad band adjacent to the body whorl suture, and there may be a second, less regular and distinct band at the base of the shell. Aperture and columellar folds white, creamy-white or bluish-white, parietal wall flushed with brown.

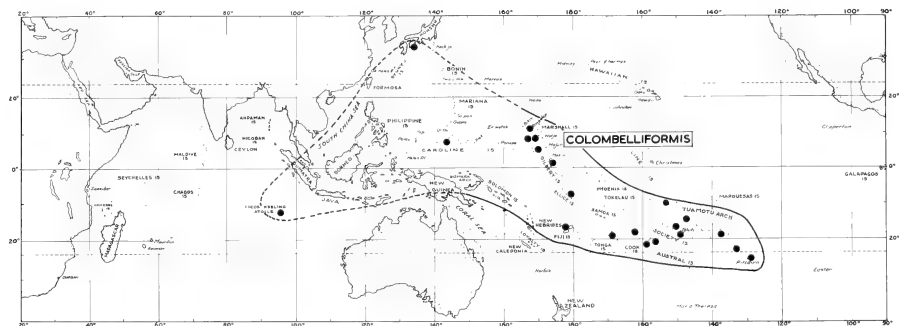


Plate 443. Geographical distribution of *Mitra (Strigatella) colombelliformis* Kiener.

Measurements (mm)—

length	width	height of aperture	
37.8	20.0	24.0	Rarotonga, Cook Ids.
34.8	17.0	22.0	Holotype of <i>colombelliformis</i>
32.4	16.6	22.0	Manava I., Fiji Ids.
29.0	14.8	15.0	Niue I.

Synonymy—

1838 *Mitra colombelliformis* Kiener, *Spécies général iconographie coquilles vivantes*, vol. 3, p. 47, pl. 15, fig. 46 (Madagascar).

1839 *Mitra striata* Gray, *Zool. Capt. Beechey's Voyage*, p. 135, pl. 39, fig. 7 (Pacific Ocean) [non Eichwald, 1830].

1840 *Mitra columbelliformis* Kiener, *Küster, Syst. Conchylien-Cabinet*, ed. 2, vol. 5, p. 122, pl. 17c, figs. 4, 5; 1844 Deshayes & Edwards, *Hist. nat. anim. s. vertébrés*, ed. 2, vol. 10, p. 351; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 18, pl. 15, figs. 255, 256 (invalid emendation).

1844 *Mitra columbellaeformis* Kiener, *Reeve, Conchologia Iconica*, vol. 2, pl. 18, fig. 138; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 33; 1966 Cernohorsky, *Archiv f. Molluskenkunde*, vol. 95, no. 5/6, p. 275, fig. 1 (radula) [invalid emendation].

1852 *Strigatella stutschburyi* Mörch, *Cat. Conchyl. Yoldi*, p. 83 (substitute name for *Mitra columbellaeformis* Reeve, 1844).

1880 *Strigatella columbellaeformis* Kiener, von Martens, *Beitr. Meeresf. Mauritius & Seychellen*, p. 256; 1935 Dautzenberg, *Mém. Mus. Roy. d'Hist. Nat. Belg.*, vol. 2, p. 102; 1965 Cernohorsky, *Veliger*, vol. 8, p. 110, pl. 17, fig. 56 (invalid emendation).

1882 *Mitra (Strigatella) limbifera (pars)* Lamarck, *Tryon, Manual Conchology*, vol. 4, p. 154, pl. 45, figs. 323-325 only (non Lamarck, 1811).

1933 *Mitra (Strigatella) columbellaeformis* Kiener, *Dautzenberg & Bouge, Journal de Conchyliologie*, vol. 77, p. 160 (invalid emendation).

1970 *Mitra (Strigatella) colombelliformis* Kiener, Cernohorsky, *Rec. Auckland Inst. Museum*, vol. 7, p. 182; 1970, *Bull. Auckland Inst. Museum*, no. 8, p. 72, pl. 4, fig. 3.

Types—The holotype of *M. colombelliformis* Kiener, is in the Muséum d'Histoire Naturelle, Geneva, no. 1108/4, and the type-specimen of *M.*

stutschburyi (Mörch), is probably among Cumming's specimens of the general collection at the British Museum (NH). The type locality is Madagascar, but this requires confirmation in view of the lack of reliable records west of the Cocos-Keeling Islands.

Records—COCOS-KEELING ISLANDS: Pulo Panjang (USNM). JAPAN: Tosa (AMNH). CAROLINE ISLANDS: Lamotrek Atoll (USNM). MARSHALL ISLANDS: Bok I., Ujae Atoll; Loi I., Kwajalein Atoll; Erapuotsu I., Rongelap Atoll; Pinglap I., Jaluit Atoll (all USNM). FIJI ISLANDS: Manava I., N. Viti Levu (Cernohorsky coll.). GILBERT & ELLICE ISLANDS: Funafuti lagoon, Ellice I.; Apamama, Gilbert I. (both USNM). NIUE ISLAND: Namoui (McDowall coll.; Cernohorsky coll.). COOK ISLANDS: Mauke Island; Tom's I., Palmerston Atoll (both USNM); Rarotonga (Coppell coll.; Cernohorsky coll.). SOCIETY ISLANDS: Flint I., off Tahiti; Point Teffaa, Huahine; Tiarei, Tahiti (all USNM). TUAMOTU ISLANDS: Vahitaki; Maia I., Tikahau (both USNM). GAMBIER ISLANDS: Motu Tarauru-roa, Mangareva I. (USNM). PITCAIRN ISLAND: (USNM). LINE ISLANDS: Flint I. (DMNH).

Mitra acuminata Swainson, 1824

(Color pl. 258, figs. 26, 27; pl. 445, fig. 1)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—The species is similar to *M. fastigium* Reeve, but has a longer, more concave and acuminate spire, smooth sutures and a yellow to orange colour.

Habitat—On reefs, under rocks, coral and coral-rubble, in the intertidal zone.

Description—Shell up to 35 mm (about 1½ inches) in length, elongate-ovate, solid, body whorl inflated, spire concave and acuminate, sutures distinct, smooth and narrowly incised. Whorls 7-9, apart from a smooth white protoconch, first 2-3 post-nuclear whorls with spiral threads which change to smooth, fine and shallow spiral grooves on later whorls, and number from 10-17

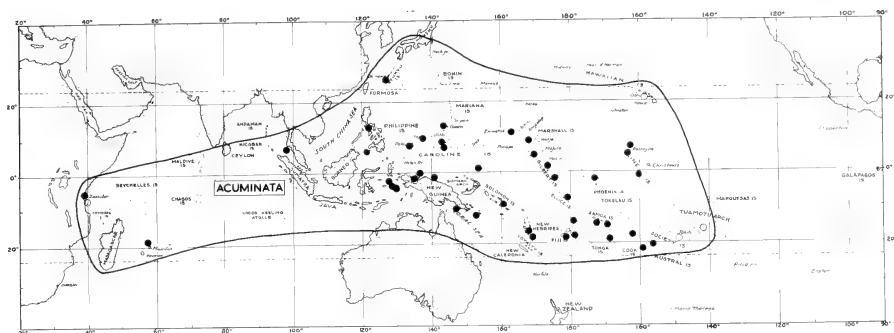


Plate 444. Geographical distribution of *Mitra (Strigatella) acuminata* Swainson.

on the penultimate and up to 40 on the body whorl; in some individuals the spiral grooves are confined to the shoulder of the body whorl, the centre is smooth and the base has up to 14 oblique spiral cords. Aperture longer than the spire, narrow but widening anteriorly, smooth within; margin of outer lip smooth, prominently thickened, interior callus distinct but blunt and elongated; columella not calloused and only glazed, and with 4-5 oblique folds, siphonal canal pointed, straight, siphonal notch prominent. Uniformly yellow, pale orange or orange-tan in colour, some individuals with a broad and pale central band on the body whorl; aperture white, occasionally flushed with rose or yellow near the margin, columella white. Periostracum thin, brown and longitudinally finely striate.

Measurements (mm)—

length	width	height of aperture	
31.0	12.4	17.8	Mkunduchi, Zanzibar
29.5	12.2	16.6	Tarawa I., Gilbert Ids.
25.2	10.2	14.3	Melekula I., New Hebrides
21.0	8.6	12.4	Ifaluk Atoll, Caroline Ids.
19.6	8.0	11.0	Samoa Ids.

Synonymy—

- 1824 *Mitra acuminata* Swainson, Quart. Journal Sci. Arts, vol. 17, no. 33, p. 36 (Mauritius); 1833, Zoological Illustrations, ser. 2, vol. 3, pl. 128, fig. 3; 1844 Reeve, Conchologia Iconica, vol. 2, pl. 20, fig. 158; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 18, pl. 8, figs. 88*, 89*; 1952 Tinker, Pacific Sea Shells, p. 64, plate facing page, lower row, fig. on left.
- 1833 *Mitra lutea* Quoy & Gaimard, Voy. L'Astrolabe, vol. 2, p. 650, pl. 45bis, figs. 7-9 (Port Dorey, New Guinea); 1838 Kiener, Species générale iconographie coquilles vivantes, vol. 3, p. 51, pl. 15, fig. 47; 1969 Kosuge, Bull. Nat. Sci. Mus. Tokyo, vol. 12, no. 4, p. 787, pl. 2, fig. 37 (juvenile specimen).
- 1880 *Strigatella acuminata* Swainson, Garrett, Journal of Conchology, vol. 3, p. 32; 1880 von Martens, Beitr. Meeresf.

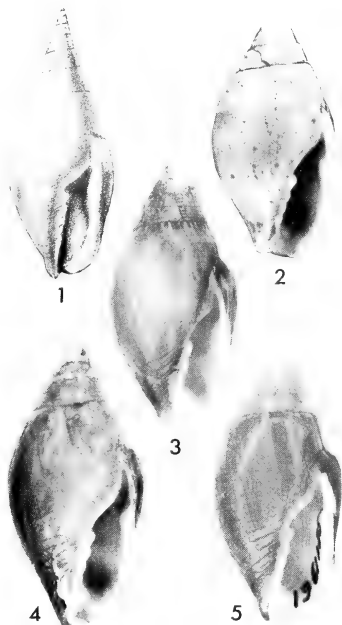


Plate 445. Fig. 1. *Mitra (Strigatella) acuminata* Swainson Figs. 2-5. *M. (S.) fastigium* Reeve.

- Fig. 1. Lectotype figure of *M. (S.) acuminata* Swainson from Mauritius (from Swainson, 1833, pl. 128, fig. 3).
- Fig. 2. Holotype of *M. (S.) fastigium* Reeve (BM (NH) 1967755; 21.0 x 10.3 mm).
- Fig. 3. Lectotype of *Strigatella fuscescens* Pease from the Hawaiian Ids. (BM (NH) 1961184; 27.1 x 12.5 mm).
- Fig. 4. Lectotype of *Strigatella brunnea* Pease from Polynesia (ANSP 29722; 21.7 x 10.5 mm).
- Fig. 5. Paralectotype of *Strigatella fuscescens* Pease from the Hawaiian Ids. (BM (NH) 1961185; 24.8 mm).

- Mauritius & Seychellen, p. 257; 1965 Cernohorsky, Veliger, vol. 8, p. 109, pl. 18, fig. 66.
 1882 *Mitra (Strigatella) acuminata* Swainson, Tryon, Manual Conchology, vol. 4, p. 153, pl. 45, fig. 312.
 1957 *Strigatella lutea* (Quoy & Gaimard), Demond, Pacific Science, vol. 11, pt. 3, p. 322.
 1961 *Mitrella acuminatula* (sic) Spry, Tanganyika Soc. Notes & Records, no. 56, p. 25, pl. 8, fig. 198.

Types—The holotype of *M. acuminata* Swainson, which used to be in Mawe's collection, is no longer extant, and we therefore designate the specimen illustrated by Swainson in the "Zoological Illustrations", series 2, vol. 3, figure 3, as the lectotype of the species. The type-specimen of *M. lutea* (Quoy & Gaimard, is in the Muséum National d'Histoire Naturelle, Paris. The type locality of *M. acuminata* is Mauritius.

Nomenclature—*Mitra acuminata* Swainson, is not a secondary homonym of *Voluta acuminata* Gmelin, 1791, which is a species of the subgenus *Costellaria*, in the subfamily Vexillinae.

Records—EAST AFRICA: Sinda, Dar-es-Salaam, Tanganyika (Spry, 1961). ZANZIBAR: near lighthouse, Mkunduchi (AIM; Powell coll.); Kizimkazi (Clover coll.). MAURITIUS: (USNM). THAILAND: Rawai reef, Phuket (Orr coll.; Cernohorsky coll.). INDONESIA: W. coast of Gomumu I., S. of Obi I., N. side of Tr Hapale, Maupa I., 3°18'S & 127°30'E; Pombo I., Haruku Straits, E. of Ambon (all WAM). PHILIPPINE ISLANDS: Tres Reyes I., Gasar, Marinduque (Lumawig coll.); Sanga Sanga I., Sulu Sea (DMNH). RYUKYU ISLANDS: Okinawa (USNM). JAPAN: Yedo Bay (USNM). MARIANAS: Asau Point, Guam I. (USNM). CAROLINE ISLANDS: Faranlep Atoll; Saratokmalel, Kapingamarangi; Tiutua, Kapingamarangi; Yap Island (all USNM); Ifaluk Atoll (Cernohorsky coll.). MARSHALL ISLANDS: Engebi I.; Eniwetok Atoll; Kwajalein Atoll; Enybor I.; Jaluit Atoll (all USNM). PALAU ISLANDS: Kayangel Island (USNM). NEW GUINEA: Tagula Island (Hinton coll.); Biak I., Schouten I.; Mios Woendi, Schouten I.; near Hollandia (all USNM); Fisherman I., Port Moresby (Kleckham coll.); N. Mios Woendi, Padoai I., Schouten I. (Powell coll.). NEW BRITAIN: Nordup near Rabaul (USNM). SOLOMON ISLANDS: Marau Sound, Guadalcanal (DMNH); Ataa (AMNH). NEW HEBRIDES: Vila, Efate I. (Debant coll.); Erakor reef, Efate I. (Dale coll.); Meli I., S.W. Efate I.; Bushmens Bay, E. coast of Malekula I. (both Cernohorsky coll.). FIJI ISLANDS: Suva reef, S. Viti Levu (Hill coll.); Lau Islands (Bergman coll.).

SAMOA ISLANDS: Apia; Ofu, Manu'a group (both USNM); Mulinuu, W. of Apia (Cernohorsky coll.). FUTUNA ISLANDS: Anse de Sigave, Hoorn I. (USNM). GILBERT & ELLICE ISLANDS: Onotoa Atoll, Gilbert I. (USNM); Bikenibeu, Tarawa I., Gilbert I. (Cernohorsky coll.); Vaitupu, Ellice I. (USNM). PHOENIX ISLANDS: Canton Island (USNM; BPBM). NIUE ISLAND: (McDowall coll.). COOK ISLANDS: Palmerston Island (Steiner coll.); Mauke Island; Rarotonga (both Coppell coll.). SOCIETY ISLANDS: (Garrett, 1880). TUAMOTU ISLANDS: (Garrett, 1880). LINE ISLANDS: Jarvis and Fanning Is. (both DMNH); Palmyra Island (USNM); Kingman reef (BPBM). HAWAIIAN ISLANDS: (Garrett, 1880; Tinker, 1952).

Fossil record—POST-PLEISTOCENE: Mokapu Peninsula, Oahu, Hawaiian Islands (Kosuge, 1969).

Mitra fastigium Reeve, 1845

(Color pl. 258, figs. 28, 29, 32; pl. 445, figs. 2-5)

Range—East Africa to Polynesia and the Hawaiian Islands.

Remarks—The species is easily recognized by its uniformly horny-brown colour, minutely crenulate sutures, white aperture and fine, short brown lines on the edge of the outer lip. This species has been usually known under the names of *M. fuscescens* (Pease) or *M. brunnea* (Pease), but Reeve's name *M. fastigium* has chronological priority.

Habitat—On reefs, under rocks and coral in crevices, in the intertidal zone.

Description—Shell up to 28 mm (about 1 1/4 inches) in length, elongate-ovate to ovate, solid, sutures distinct, narrowly channeled and finely crenulate. Whorls 5-7, apart from an eroded white protoconch, spire whorls weakly convex, sculptured with shallow and smooth spiral grooves which number from 3-7 on the penultimate whorl; on the body whorl the first 3-6 spiral grooves are confined to the shoulder, the centre is usually smooth, and towards the base there are 2-5

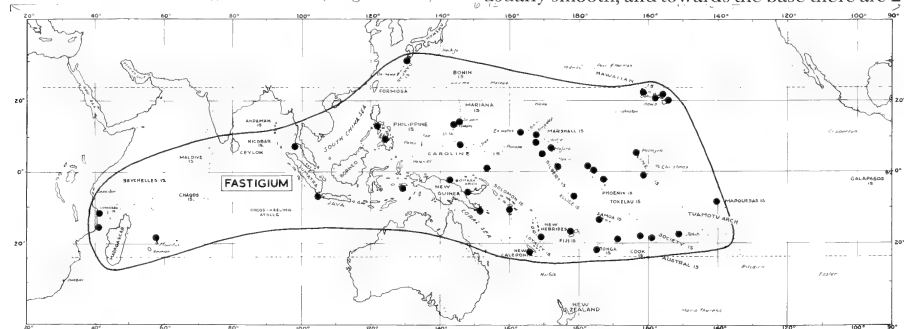


Plate 446. Geographical distribution of *Mitra (Strigatella) fastigium* Reeve.

grooves which are followed by up to 10 oblique cords. The aperture is longer than the spire, narrow but slightly widening anteriorly, smooth within; outer lip prominently thickened, interior callosity either prominent or almost absent, margin of outer lip smooth. Columella calloused anteriorly and with 4-5 strong, oblique folds, parietal wall glazed, posteriorly with a thin callus; siphonal fasciole short and straight, siphonal notch prominent. Uniformly dark tan in colour, occasionally with slightly paler axial streaks, ornamented with obsolete, faint brown spiral lines which are obscured on the body whorl but become apparent on the back of the outer lip and continue as spots or short lines onto the white calloused margin; aperture and columella white, parietal wall white but edged with brown. Periostracum thin, dark brown and moderately opaque.

Measurements (mm)—

length	width	height of aperture	
27.1	12.5	17.3	Lectotype of <i>fuscescens</i>
25.1	x1.6	15.4	Boac I., Philippines
23.6	11.6	15.5	Mozambique, E. Africa
21.7	10.5	14.1	Lectotype of <i>brunnea</i>
21.0	10.3	13.0	Holotype of <i>fastigium</i>
19.0	9.8	12.6	Mokulea reef, Hawaiian Ids.
15.8	8.5	10.5	Viti Levu Bay, Fiji Ids.

Synonymy—

- 1840 *Mitra discolor* Küster, Syst. Conchylien-Cabinet, ed. 2, vol. 5, p. 107, pl. 17a, figs. 6-8 (no locality given) [non *M. discolor* Röding, 1798].
- 1845 *Mitra fastigium* Reeve, Conchologia Iconica, vol. 2, pl. 28, fig. 221 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. x8, pl. 21, fig. 435.
- 1860 *Strigatella fuscescens* Pease, Proc. Zool. Soc. London, p. 146 (Sandwich Islands); 1965 Kay, Bull. Brit. Mus. ZNat. Hist., Zoology, Suppl. vol. 1, p. 29, pl. 3, figs. 7, 8 (figured lectotype).
- 1865 *Mitra brunnea* Pease, Carpenter, Proc. Zool. Soc. London, p. 517 (in synonymy of *Strigatella fuscescens* Pease); 1868 Pease, American Journ. Conchology, vol. 3, p. 233; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 18, pl. 21, fig. 441; 1969 Kosuge, Bull. Nat. Sci. Museum Tokyo, vol. 12, no. 4, p. 786, pl. 2, fig. 33.
- 1868 *Strigatella brunnea* Pease, American Journ. Conchology, vol. 3, p. 215, pl. 15, fig. 7 (Polynesia); 1880 Garrett, Journal of Conchology, vol. 3, p. 33.
- 1874 *Mitra fuscescens* Pease, Sowerby, Thesaurus Conchyliorum, vol. 4, p. 18, pl. 16, fig. 303.
- 1882 *Mitra (Strigatella) fastigium* Reeve, Tryon, Manual Conchology, vol. 4, p. 154, pl. 45, fig. 320.
- 1882 *Mitra (Strigatella) brunnea* Pease, Tryon, *ibid.*, p. 153, pl. 45, fig. 301.
- 1965 *Strigatella oleacea* (Reeve), Cernohorsky, Veliger, vol. 8, p. 112, pl. 18, fig. 63 (non *Mitra oleacea* Reeve, 1844).
- 1970 *Mitra (Strigatella) fastigium* Reeve, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 14, textfig. 67 (radula); 1970, Rec. Auckland Inst. Museum, vol. 7, p. 182.

Types—The faded and weathered holotype of *M. fastigium* Reeve, B.M. (NH) no. 1967755, and

the lectotype of *M. fuscescens* (Pease) [selected Kay, 1965], B.M. (NH) no. 1961184, are in the British Museum (NH). There are 6 syntypes of *M. brunnea* (Pease), in the Academy of Natural Sciences, Philadelphia, no. 29722, and the largest, 21.7 mm long specimen, is here selected as the lectotype. No locality was given by Reeve for *M. fastigium*, and we designate Bohol Islands, Philippine Islands, as the type locality.

Records—EAST AFRICA: Mozambique (USNM); Moshinga I., off Mocimba da Praia, Mozambique (Orr coll.). MAURITIUS: (Concaud coll.; Cernohorsky coll.). THAILAND: Goh Huyong, Similan I. (USNM). INDONESIA: Pulau Penju, S. of Sumatra (USNM); Tg Nama, S. side of Ambon Bay, Ambon I. (WAM). PHILIPPINE ISLANDS: Pangangan I., Bohol (Steiner coll.); Boac, Marinduque (Clover coll.). JAPAN: Oshima, Osumi (USNM). MARIANAS: Apra Harbour, Guam I.; Rota Island (both USNM); Nimitz Beach, Guam I. (Cernohorsky coll.). CAROLINE ISLANDS: Satawal Atoll; Tiatua, Kapingamarangi (both USNM). MARSHALL ISLANDS: Engebi I., Eniwetok Atoll; Mella I., Rongelap Atoll; Lae Atoll; Enybor I., Jaluit Atoll (all USNM); Majuro (DMNH). NEW GUINEA: Malai I., Siassi I. (Hinton coll.); Seleo Island (USNM); Smarai Island (Kleckham coll.). NEW BRITAIN: Tamunea Island (Hinton coll.). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.). NEW HEBRIDES: Black Sands, Efate I. (Colardeau coll.); Pango Point, Efate I. (Allan coll.). NEW CALEDONIA: (USNM). FIJI ISLANDS: Viti Levu Bay, N.E. Viti Levu (Cernohorsky coll.). TONGA ISLANDS: reef near Nukualofa, Tongatapu (Gay coll.; Cernohorsky coll.). SAMOA ISLANDS: Asau Harbour, Savaii (USNM); GILBERT & ELLICE ISLANDS: Vaitupu, Ellice I. (USNM); Bikenibeu, Tarawa I., Gilbert I. (Cernohorsky coll.). BAKER ISLANDS: (USNM). HOWLAND ISLAND: (USNM). PHOENIX ISLANDS: Canton Island (USNM). NIUE ISLAND: Alofi (USNM; McDowall coll.). COOK ISLANDS: Palmerston Island (Steiner coll.); N. tip of Aitutaki, Aitutaki I. (USNM). SOCIETY ISLANDS: Raiatea Island (Deynzer coll.). MARQUESAS ISLANDS: Taihoae Bay, Nukuhiva (USNM). LINE ISLANDS: Palmyra Island (USNM); Jarvis Island (AIM). HAWAIIAN ISLANDS: Kahala, Honolulu, Oahu; Hilo; Honokowai, Maui (all USNM); Niihau Island (AIM); Mokulea reef, Oahu (Leehman coll.; Cernohorsky coll.).

Fossil record—POST-PLEISTOCENE: Mokapu Peninsula, Oahu, Hawaiian Islands (Kosuge, 1969).

Mitra pellisserpentis subspecies *pellisserpentis* Reeve, 1844

(Color pl. 258, figs. 33-37; pl. 447, figs. 1-9)

Range—Mauritius to Polynesia.

Remarks—This is one of the most variable of strigatelliform mitrids which has received no fewer than 13 names. The species varies from being broadly-ovate to slender-elongate, the sculpture is prominently granulose or may become obsolete, and the colour varies from a yellowish-orange to dark brown or olive-brown. The most frequently encountered forms are as follows:

Typical, granulose form; *pellisserpentis* Reeve (= *granata* Reeve = *grelloisi* Récluz).

Slender, granulose **form**: *brumalis* Reeve (= *serotina* A. Adams = *microstoma* Sowerby = *minor* Dautzenberg & Bouge).

Broad, granulose **form**: *uzielliana* Crosse (= *nassoides* Sowerby).

Broad, smooth **form**: *crenilabris* A. Adams (= *dealbata* A. Adams; worn and faded white).

Habitat—On reefs, under rocks, coral, coral-rubble and in crevices of living coral, from the intertidal zone to a depth of 2 fathoms.

Description—Shell up to 36 mm (about 1½ inches) in length, elongate-ovate or slender and elongate, solid, sutures impressed but narrowly incised. Whorls 6½–8½, apart from a protoconch of 2 glassy-white, smooth nuclear whorls, spire

whorls flat-sided or weakly convex, sculptured with spiral rows of small granules which number from 0–12 on the penultimate and from 0–30 on the body whorl; in some granulose individuals, the body whorl sometimes develops weak, irregular and slender axial riblets; in the granulose forms, the interspaces between the granules are macroscopically reticulated. In smooth specimens, the first 3–4 post-nuclear whorls are granulose, the beading fades out on the antepenultimate whorl and the sculpture on the last 2 whorls consists of either weak spiral threads or weak axial riblets. Aperture longer than the spire, narrow and smooth within, outer lip thickened, interior with a variable-sized callus, margin of outer lip with



Plate 447. Figs. 1–9. *Mitra* (*Strigatella*) *pellisserpentis* *pellisserpentis* Reeve Figs. 10, 11. *M. (S.) pellisserpentis* *astricta* Reeve.

Fig. 1. Lectotype of *M. (S.) pellisserpentis* *pellisserpentis* Reeve from the Philippine Ids.; granulose form (BM (NH) 1967834; 30.6 x 12.1 mm).

Fig. 2. Lectotype of *M. crenilabris* A. Adams; broad, smooth form (BM (NH) 1967732; 30.9 x 12.0 mm).

Fig. 3. Specimen from Head of Taiohae Bay, Nukuhiva, Marquesas Ids.; broad, smooth form (USNM; 28.0 x 10.8 mm).

Fig. 4. Syntype of *M. granata* Reeve from Ticao Id., Philippine Ids.; intermediate, granulose form (BM (NH) 1967774; 19.9 x 7.9 mm).

Fig. 5. Holotype of *M. dealbata* A. Adams; very worn speci-

men (BM (NH) 1967741; 26.0 x 9.7 mm).

Fig. 6. Holotype of *M. cretacea* Sowerby from Mauritius; very worn specimen (NMW; 24.2 x 8.3 mm).

Fig. 7. Lectotype of *M. serotina* A. Adams from the Marquesas Ids.; slender, granulose form (BM (NH) 1967882; 19.4 x 6.6 mm).

Fig. 8. Syntype of *M. serotina* A. Adams; slender, smooth form (BM (NH) 1967882; 21.9 x 7.3 mm).

Fig. 9. Specimen from Head of Taiohae Bay, Nukuhiva, Marquesas Ids.; slender, granulose form (USNM; 21.7 x 7.3 mm).

Fig. 10. Lectotype figure of *M. (S.) pellisserpentis* *astricta* Reeve (from Reeve, 1844, pl. 24, fig. 188).

Fig. 11. Lectotype of *M. samuelis* Dohrn from the Hawaiian Islands (BM (NH) 1967875; 27.7 x 10.6 mm).

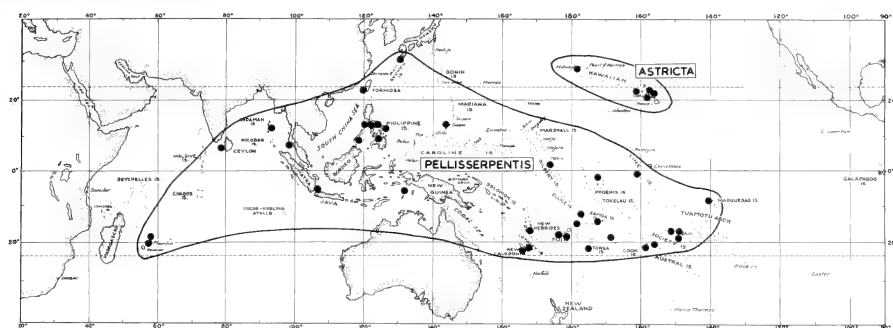


Plate 448. Geographical distribution of *Mitra (Strigatella) pellisserpentis* Reeve, and its subspecies *M. (S.) pellisserpentis astricta* Reeve.

elongated crenulations. Columella calloused, and with 4-6 oblique folds, base of shell constricted, siphonal fasciole straight and usually calloused, siphonal notch prominent. Uniformly yellowish-orange, orange-brown, olive-brown or dark brown in colour, occasional specimens with a pale central zone or white axial stripes on the body whorl, and in rare individuals, very faint, orange-brown lines are discernible at least on the back of the outer lip; aperture and columella cream, yellow or orange in colour. Periostracum very thin, orange-brown and translucent.

Measurements (mm)—

length	width	height of aperture	
36.4	14.5	19.8	Holotype of <i>nassoides</i>
31.0	11.0	—	Type-specimen of <i>grelloisi</i>
30.9	12.0	15.8	Lectotype of <i>crenilabris</i>
30.6	12.1	16.7	Lectotype of <i>pellisserpentis</i>
28.0	10.8	15.2	Nukuhiva, Marquesas
27.0	11.0	14.2	Mauritius
26.0	9.7	14.5	Holotype of <i>dealbata</i>
25.0	11.0	—	Holotype of <i>uzielliana</i>
24.2	8.3	13.8	Holotype of <i>cretacea</i>
23.0	9.5	12.4	Boac I, Philippines
19.4	6.6	9.8	Lectotype of <i>serotina</i>
18.6	7.2	9.6	Lectotype of <i>granata</i>
16.1	5.6	7.8	Holotype of <i>brumalis</i>
15.5	7.0	9.0	Malekula I, New Hebrides

Synonymy—

- 1839 *Mitra impressa* Anton, Verz. Conchylien, p. 67 (Japan);
 1839 Küster, Syst. Conchylien-Cabinet, ed. 2, p. 76, pl. 14, figs. 6, 7; 1845 Reeve, Conchologia Iconica, vol. 2, pl. 31, fig. 250; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 7, pl. 8, fig. 106 only; 1882 Tryon, Manual of Conchology, vol. 4, p. 132, pl. 38, fig. 132; 1952 Kuroda & Habe, Check List Rec. mar. moll. Japan, p. 67.
 1844 *Mitra pellisserpentis* Reeve, Conchologia Iconica, vol. 2, pl. 10, fig. 66 (Islands of Mindoro and Bohol, Philippines);

- 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 22, pl. 13, fig. 209; 1880 Garrett, Journal of Conchology, vol. 3, p. 24; 1952 Kuroda & Habe, Check List Rec. mar. moll. Japan, p. 67.
 1845 *Mitra granata* Reeve, *ibid.*, pl. 33, fig. 271 (Island of Ticao, Philippines).
 1845 *Mitra brumalis* Reeve, *ibid.*, pl. 34, fig. 280 (Philippine Islands).
 1853 *Mitra serotina* A. Adams, Proc. Zool. Soc. London, for 1851, p. 132 (Marquesas Islands).
 1853 *Mitra crenilabris* A. Adams, *ibid.*, p. 140 (no locality given).
 1853 *Mitra dealbata* A. Adams, *ibid.*, p. 140 (no locality given).
 1853 *Mitra grellouisi* Recluz, Journal de Conchyliologie, vol. 4, p. 247, pl. 7, fig. 8 (Island of the Pacific Ocean).
 1861 *Mitra uzielliana* Crosse, Journal de Conchyliologie, vol. 9, p. 285 (Tahiti ?); 1862, Journal de Conchyliologie, vol. 10, p. 50, pl. 1, fig. 2.
 1874 *Mitra microstoma* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 21, pl. 16, fig. 291 (no locality given).
 ?1874 *Mitra cretacea* Sowerby, *ibid.*, p. 21, pl. 26, figs. 577, 578 (Mauritius) [non *M. cretacea* Gabb, 1864].
 1874 *Mitra nassoides* Sowerby, *ibid.*, p. 22, pl. 27, fig. 631 (Mauritius) [non *M. nassoides* Grateloup, 1847].
 1923 *Mitra (Chrysame) pellisserpentis* Reeve, Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 127; 1933, Journal de Conchyliologie, vol. 77, p. 183.
 1923 *Mitra (Chrysame) pellisserpentis* var. *minor* Dautzenberg & Bouge, *ibid.*, p. 130 (Isle des Pins, New Caledonia and Lifu, Loyalty Islands) [non Weinkauff, 1868; nec Sowerby, 1874].
 1935 *Mitra (Nebularia) pellisserpentis* Reeve, Dautzenberg, Mém. Mus. Roy. d'Hist. Nat. Belg., vol. 2, p. 75.
 1936 *Mitra (Chrysame) pellisserpentis granata* Reeve, Hirase, Coll. Japanese shells, p. 70, pl. 101, fig. 6.
 1957 *Scabricola pellisserpentis* Reeve, Kaicher, Indo-Pacific sea shells, pl. 2.
 1961 *Chrysame pellisserpentis* (Reeve), Habe, Col. Illust. Shells of Japan, vol. 2, p. 69, pl. 34, fig. 11; 1964 Habe, Shells west. Pacific in colour, vol. 2, p. 107, pl. 34, fig. 11.
 1964 *Strigatella pellisserpentis* (Reeve), J. Cate & Burch, Veliger, vol. 6, p. 143; 1965 Cernohorsky, Veliger, vol. 8, p. 113, pl. 17, fig. 60; 1967, Marine Shells of the Pacific, vol. 1, p. 150, pl. 34, fig. 230.
 1970 *Mitra (Strigatella) pellisserpentis* Reeve, Cernohorsky, Rec. Auckland Inst. Museum, vol. 7, p. 182; 1970, Bull. Auckland Inst. Museum, no. 8, p. 15, textfig. 74 (radula), pl. 4, figs. 4, 5 (shell).

Types—The following types are in the British Museum (NH): the lectotype, here designated,

and 2 syntypes of *M. pellisserpentis* Reeve, B.M. (NH) no. 1967834; the lectotype, here designated, and 2 syntypes of *M. granata* Reeve, B.M. (NH) no. 1967774; the holotype of *M. brumalis* Reeve, B.M. (NH) no. 1966716; the lectotype, here designated, and 2 syntypes of *M. crenilabris* A. Adams, B.M. (NH) no. 1967732; the lectotype, here designated, and 2 syntypes of *M. serotina* A. Adams, B.M. (NH) no. 1967882, and the holotype of *M. dealbata* A. Adams, B.M. (NH) no. 1967741. The holotype of *M. nassoides* Sowerby (non Grateloup) and *M. cretacea* Sowerby (non Gabb), are in the National Museum of Wales, Cardiff. The type specimens of *M. grelloisi* Récluz, and *M. uzielliana* Crosse, are in the Muséum National d'Histoire Naturelle, Paris (Journal de Conchyl. coll.). Reeve gave the localities Mindoro and Bohol Islands, and we restrict the type locality to Mindoro Island, Philippine Islands.

Nomenclature—Anton (1839) described *M. impressa*, which was illustrated by Küster in the same year, but the name remained unused during the 20th century, until re-introduced into literature by Kuroda and Habe (1952). The specimen illustrated by Küster is undoubtedly a young specimen of *M. pellisserpentis* Reeve, but the name *M. impressa* can be rejected as a forgotten name, since the taxon *M. pellisserpentis* has been used more than 10 times by at least 5 different authors during the last 50 years (Declaration 43, International Commission on Zoological Nomenclature, 1970).

Mitra cretacea Sowerby, is placed tentatively in the synonymy of *M. pellisserpentis*. The holotype does resemble the species, but is far too worn and faded for positive identification.

Records—MAURITIUS: (USNM; DMNH Coucaud coll.; Cernohorsky coll.); Sor (Maujean coll.). ANDAMAN ISLANDS: Port Blair (Steiner coll.). CEYLON: (USNM). THAILAND: Ko He I., Phuket; Rawai, Phuket (both Orr coll.; Cernohorsky coll.). INDONESIA: Keledjitan, Bantam, Java (USNM); Tg Sermaaf, N.W. coast of Kur I., Kai I. (WAM). PHILIPPINE ISLANDS: Mindoro Island; Ticao Island (both DMNH; BMNH); Boac, Marinduque (Lumawig coll.; Cernohorsky coll.); Pangangan I., Bohol (Steiner coll.); Brooke's Point, Palawan I. (USNM); Eastern Samar (Dan coll.; Cernohorsky coll.). FORMOSA: S.W. Taiwan (Steiner coll.). JAPAN: Oshima, Osumi (USNM). MARIANAS: Apra Harbour, Guam I., Tumon Bay, Guam I. (both USNM). NEW HEBRIDES: Bushmans Bay, E. coast of Malekula I. (Cernohorsky coll.). LOYALTY ISLANDS: Lifu (USNM). NEW CALEDONIA: Kuakue Bay (USNM). WALLIS & FUTUNA ISLANDS: Anse de Sigave, Hoorn I., Futuna I.; W. of Point Matahauki, Faioa, Wallis I. (both USNM). FIJI ISLANDS: Momi reef, W. Viti Levu; Lomalagi, S. Viti Levu (both Cernohorsky coll.). GILBERT ISLANDS: Bikenibeu, Tarawa I. (Cernohorsky coll.). TONGA ISLANDS: Nuku'alofa, Tongatapu (Gay coll.; Cernohorsky coll.). SAMOA ISLANDS: Luatua'u'u, Upolu (Powell coll.). NIUE ISLAND: Namoui (McDowall coll.). COOK ISLANDS: Mauke Island; Motu Toa, Rarotonga (both USNM); Rarotonga (AIM; Cernohorsky coll.). JARVIS ISLAND: (AIM). PHOENIX ISLANDS: Canton Is-

land (USNM). SOCIETY ISLANDS: Arue, Tahiti; Papeete Harbour, Tahiti; Motu Irimu, Raiatea (all USNM); Raiatea Island (Tourres coll.); Point Venus, Tahiti (Clover coll.). MARQUESAS ISLANDS: Head of Taiohae Bay, Nukuhiva, 5-15 ft. (USNM).

Mitra pellisserpentis subspecies *astricta* Reeve, 1844

(Color pl. 258, figs. 38, 39; pl. 447, figs. 10, 11)

Range—Hawaiian and Midway Islands.

Remarks—The Hawaiian form of *M. pellisserpentis* is a very weak subspecies and differs from the nominate subspecies only in colour ornamentation. Almost all specimens of *astricta* have wide-spaced or close-set dark brown lines on the whorls, whereas these lines appear only rarely in the Indo-Pacific *pellisserpentis*; even when present, they are very faint, but are quite distinct and prominent even in beach-worn specimens of *astricta*. The same variational range is encountered in the Hawaiian *astricta*, and broad and slender, granulate and smooth specimens are known. Specimens will reach a length of 37.0 mm (about 1½ inches).

Habitat—On reefs, from the intertidal zone to a depth of 3 fathoms.

Measurements (mm)—

length	width	height of aperture	
34.0	15.5	16.2	Halawa, Molokai
30.4	13.1	15.6	Waikiki
27.7	10.6	14.8	Lectotype of <i>samuelis</i>
21.0	8.4	12.0	Honolulu
17.6	6.9	9.6	Kailua Bay, Oahu

Synonymy—

1844 *Mitra astricta* Reeve, Conchologia Iconica, vol. 2, pl. 24, fig. 188 (no locality given); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 22, pl. 13, figs. 206, 208, 224; 1880 Garrett, Journal of Conchology, vol. 3, p. 10; 1950 OSTERGAARD, Pacific Science, vol. 4, no. 2, p. 86, fig. 4 (spawning and development).

1860 *Mitra samuelis* Dohrn, Proc. Zool. Soc. London, p. 368; 1861, Malakozool. Blätter, vol. 8, p. 137. (Hawaiian Islands).

1882 *Mitra (Strigatella) astricta* Reeve, Tryon, Manual Conchology, vol. 4, p. 154, pl. 45, figs. 315-318.

1969 *Mitra pellisserpentis* Reeve, Kosuge, Bull. Nat. Sci. Mus. Tokyo, vol. 12, no. 4, p. 787, pl. 2, figs. 26, 38 (non Reeve, 1844).

1970 *Mitra (Strigatella) pellisserpentis astricta* Reeve, Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 8, textfigs. 13, 13a and p. 15, textfig. 75 (radula).

Types—The type-specimen of *M. astricta* Reeve, has been sold at auction of the Norris collection and is no longer traceable. Three syntypes of *M. samuelis* Dohrn, are in the British Museum (NH) no. 1967875, and the 27.7 mm long speci-

men, which closely corresponds to Dohrn's cited dimensions, is here selected as the lectotype. No locality was given by Reeve, and we designate Honolulu, Oahu, Hawaiian Islands, as the type locality (specimens in ZMC).

Records—HAWAIIAN ISLANDS: Kuhio Bay, 3 faths.; Halawa, Malokai; Pupukea Beach, Oahu; Honolulu Harbour entrance, Oahu; Black Point, Haunama Bay, Oahu (all USNM); Coconut Island, Oahu (AMNH); Niihau Island (AIM); Honolulu, Oahu; Hilo (both ZMC); Waikiki, Oahu (Clover coll.); Alamoana Reef (DMNH); Sunset Beach, Oahu; Kawaiaho Beach, Oahu (both Leehman coll.); Diamond Head, Honolulu, Oahu (Powell coll.); Kailua Bay, Oahu (Clover coll.; Cernohorsky coll.). MIDWAY ISLANDS: (USNM).

Fossil records—POST-PLEISTOCENE: Wailupe Quarries, Oahu; Mokapu Peninsula, Oahu, Hawaiian Islands (both Kosuge, 1969).

Mitra bellula A. Adams, 1853

(Pl. 449)

Range—Philippine Islands and ? Japan.

Remarks—The holotype remains the only specimen known. Subsequent literature records are repetitions of the original description, and no specimens resembling the species have been collected since the date of description. We strongly suspect that *M. bellula* is a very worn, atypical or aberrant form of a previously described species; the cancellate upper whorls and general shape bear a faint resemblance to *Mitra* (*Strigatella*) *pellisserpentis* Reeve. A. Adams (1864) subsequently reported the species from Japan, but assigned it to the vexilline subgenus *Costellaria*; even in its worn condition it is obvious that the species is mitrine and not vexilline, and Adams' Japanese specimen may have been something different.

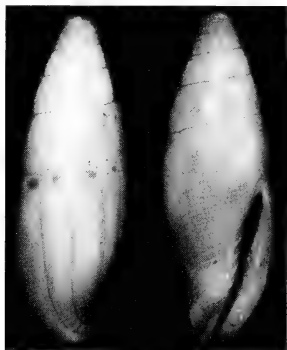


Plate 449. *Mitra* (*Strigatella*) *bellula* A. Adams. Holotype from Capul Id., Philippine Ids. (BM (NH) 1966715; 14.9 × 5.1 mm) [photo courtesy J. Taylor, BM (NH)].

Habitat—On the reefs, low water (A. Adams, 1853).

Description—Holotype: Shell 15 mm (about ½ inch) in length, solid, elongate-ovate, sutures distinct but sharply incised and irregular on the dorsal side of the body whorl. Whorls 6, apex missing, spire whorls regularly convex, first 3 whorls clathrate with bisecting spiral and axial cords of about equal strength; the spiral cords weaken and axial cords become obsolete on the last 3 whorls. Spiral striae number 7 on the penultimate and 15 on the body whorl, apart from 10 oblique cords at the base. The dorsal side of the body whorl has 4 wide-spaced growth-striae. Aperture about equal in height to the spire, narrow and smooth within; outer lip thickened and simple. Columella slightly calloused and with 6 prominent, oblique folds. Siphonal fasciole twisted and slightly recurved to the left, siphonal notch prominent. Colour white in the beach-worn type, sutures of the last 3 whorls with small, brown spots.

Measurements (mm)—

length	width	height of aperture	
14.9+	5.1	7.6	Holotype of <i>bellula</i>

Synonymy—

1853 *Mitra bellula* A. Adams, Proc. Zool. Soc. London, for 1851, p. 138; (Capul Island, Philippine Islands); 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 17, pl. 26, fig. 593 (figured holotype).

†1864 *Costellaria bellula* A. Adams, Journ. Linn. Soc. London, vol. 7, p. 200.

1882 *Mitroidea bellula* A. Adams, Tryon, Manual Conchology, vol. 4, p. 163, pl. 47, fig. 375.

Types—The worn and faded holotype of *M. bellula* A. Adams, is in the British Museum (NH), no. 1966715. The type locality is Capul Islands, Philippine Islands.

Records—PHILIPPINE ISLANDS: Capul Island (type-locality). JAPAN: ? Gotto, 48 faths. (A. Adams, 1864).

Mitra typha Reeve, 1845

(Pl. 450)

Range—Red Sea to Polynesia and the Hawaiian Islands.

Remarks—This is one of the smallest and most widely distributed and rare mitrid, which is tentatively placed in the subgenus *Strigatella* on the basis of the presence of the interior callosity of the outer lip in adult specimens. The species is variable in colour and consequently has received numer-

ous names; specimens are white and usually banded with orange-brown, some specimens having 1 band on the spire whorls and 1 or 2 bands on the body whorl. Some individuals, however, are banded only on the body whorl, while others lack



the bands and are either flushed with orange-brown or are white. The bandless colour-forms were described as *M. tenuis* Sowerby, *M. flexilabris* Sowerby, and *M. saltata* Pease, while the uniformly white colour form is the *M. alba* Pease.

Habitat—On reefs, among sand and coral rubble, from the intertidal zone to a depth of 18 fathoms.

Description—Shell up to 14 mm (about ½ inch) in length, fusiformly-elongate, adult specimens moderately solid, immature specimens thin and often pellucid, sutures distinct but very narrow and sharply incised, spire acuminate. Whorls 5-6, apart from a protoconch of 3-3½ cylindrical, smooth, white or light fawn nuclear whorls, spire whorls regularly convex or almost flat-sided, sculptured with very fine spiral and longitudinal striae of about equal strength to the antepenultimate whorl, and then the spiral striae retain their strength while the axial striae frequently become weak or obsolete on the last 3 whorls; spiral striae number from 6-13 on the penultimate and from 20-30 on the body whorl, striae usually gain in strength towards the base where they appear as fine basal cords. Aperture about equal in height to the spire, narrow and smooth within, outer lip thickened in adults and slightly constricted and calloused within, smooth at the margin, immature specimens with a weak outer lip which lacks the callus. Columella calloused in mature specimens, and with 3-5 oblique folds, siphonal canal moderately short and straight, siphonal notch distinct. White in colour, usually ornamented with a single and moderately broad, orange-brown band on the spire whorls and 1 or 2 bands on the body whorl; some individuals have a single band on the body whorl and none on the spire whorls, while other specimens are uniformly white or flushed with light orange-brown. The aperture and columella are white, and occasionally show a faint orange-brown tint.

Measurements (mm)—

length	width	height of aperture	
13.1	4.6	6.7	New Caledonia
13.1	4.1	6.9	Holotype of <i>flexilabris</i>
12.3	3.7	6.0	Holotype of <i>tenuis</i>
12.2	3.7	6.0	Seychelles Islands
9.2	3.1	5.0	Lectotype of <i>typha</i>
7.7	2.6	3.8	Eilat, Gulf of Aqaba
7.7	2.4	3.7	Lectotype of <i>saltata</i>
7.5	2.3	3.5	Lectotype of <i>alba</i>

Synonymy—

1845 *Mitra typha* Reeve, *Conchologia Iconica*, vol. 2, pl. 33, fig. 267 (Loay, Bohol I., Philippines); 1874 Sowerby,

Plate 450. *Mitra (Strigatella) typha* Reeve.

Fig. 1. Lectotype from Loay, Bohol Id., Philippine Ids. (BM (NH) 1967904; 9.2 x 3.1 mm).

Fig. 2. Lectotype of *M. saltata* Pease from the Central Pacific (MCZ 260605; 7.7 x 2.4 mm).

Fig. 3. Lectotype figure of *M. micans* Reeve from the South Pacific Ocean; broad, banded form (from Reeve, 1845, pl. 34, fig. 285).

Figs. 4, 5. Specimen from reef 12 mi. off Baie du Mondouze, New Caledonia; intermediate, banded form (WOC coll.; 13.3 x 4.6 mm).

Fig. 6. Lectotype of *Thala alba* Pease from the Tuamotu Archipelago; slender, albino form (ANSP 28755; 7.5 x 2.3 mm).

Fig. 7. Specimen from Tahiti, Society Ids.; broad, albino form (WOC coll.; 5.4 x 2.0 mm).

Figs. 8, 9. Holotype of *M. flexilabris* Sowerby from Mauritius (ANSP 28639; 13.1 x 4.1 mm).

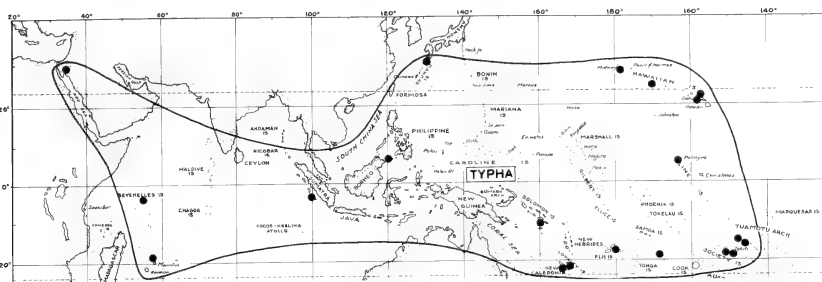


Plate 451. Geographical distribution of *Mitra (Strigatella) typha* Reeve.

- Thesaurus Conchyliorum, vol. 4, p. 6, pl. 17, fig. 323; 1880 Garrett, Journal of Conchology, vol. 3, p. 28; 1882 Tryon, Manual Conchology, vol. 4, p. 128, pl. 37, fig. 113 only; 1923 Dautzenberg & Bouge, Journal de Conchyliologie, vol. 67, p. 94 (with var. *micans* Reeve and *flexilabris* Sowerby).
- 1845 *Mitra micans* Reeve, Conchologia Iconica, vol. 2, pl. 34, fig. 285 (South Pacific Ocean) [broad form]; 1873 Garrett, Proc. Zool. Soc. London, for 1872, p. 841; 1874 Sowerby, Thesaurus Conchyliorum, vol. 4, p. 129, pl. 37, fig. 120.
- 1865 *Mitra (Strigatella) saltata* Pease, Proc. Zool. Soc. London, p. 512 (Central Pacific).
- 1868 *Thala alba* Pease, Americ. Journ. Conchology, vol. 3, p. 215, pl. 15, fig. 8 (Tuamotu Archipelago).
- 1868 *Thala saltata* Pease, *ibid.*, p. 216.
- 1874 *Mitra tenuis* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 6, pl. 17, fig. 327 (no locality given) [immature specimen]; 1882 Tryon, Manual Conchology, vol. 4, p. 129, pl. 37, fig. 117; 1884 E. A. Smith, Rept. zool. coll. H.M.S. "Alert", p. 498, pl. 44, fig. N (non *M. tenuis* Beyrich, 1854).
- 1875 *Mitra flexilabris* Sowerby, Proc. Zool. Soc. London, p. 127, pl. 24, fig. 4 (Mauritius); 1882 Tryon, Manual Conchology, vol. 4, p. 128, pl. 37, fig. 98.
- 1880 *Mitra alba* Pease, Garrett, Journal of Conchology, vol. 3, p. 12; 1963 J. Cate, Veliger, vol. 6, p. 37, pl. 7, fig. 37.
- 1880 *Strigatella flexilabris* Sowerby, von Martens, Beitr. Meerest. Mauritius & Seychellen, p. 257.
- 1882 *Mitra (Aidone) alba* Pease, Tryon, Manual Conchology, vol. 4, p. 129, pl. 51, fig. 471.
- 1903 *Mitra tenuis* var. *minor* Sturany, Denk. Kais. Akad. Wiss. Wien, vol. 74, p. 36, pl. 7, fig. 7 (Koseir, Red Sea) [non Weinkauff, 1868; nec Sowerby, 1874].
- 1963 *Mitra pellucida* "Dall MS", J. Cate, Veliger, vol. 6, p. 37, pl. 7, fig. 35 (nomen nudum).

Types—Three syntypes of *M. typha* Reeve, are in the British Museum (NH) no. 1967904, and the 9.2 mm long specimen is designated as the lectotype; the type-specimen of *M. micans* Reeve, originally in the Metcalfe collection, is no longer extant. The holotype of *M. tenuis* Sowerby (non Beyrich), is in the British Museum (NH) no. 1879.2.26. The holotype of *M. flexilabris* Sowerby, ANSP no. 28639, and 4 syntypes of *M. alba* (Pease), ANSP no. 28755, are both in the Academy of Natural Sciences, Philadelphia; the 7.5 mm long syntype, is here selected as the lectotype of *M. alba*. Three syntypes of *M. saltata* Pease, are in

the Museum of Comparative Zoology, Harvard, no. 260605, and the 7.7 mm long specimen, is here selected as the lectotype. The type locality of *M. typha* is Loay, Bohol Island, Philippine Islands.

Nomenclature—The species, and its named variants, have been assigned to *Mitra*, *Thala*, *Aidone* and *Strigatella*, but the interior callosity of the outer lip favours an assignment to *Strigatella*. The species is rare live-collected, but beach specimens appear to be quite common in Tahiti; most of these specimens examined are white, but in some individuals faint bands are apparent. J. Cate's (1963) type designation of Huahine, Society Islands, for *M. alba* (Pease), is invalid, since Pease clearly described his species from the Tuamotu Archipelago.

Records—RED SEA: Eilat, Gulf of Aqaba (Hadar coll.; Cernohorsky coll.); Nawibi, Gulf of Aqaba; Koseir (both Sturany, 1903). INDIAN OCEAN ISLANDS: Seychelles Islands, 4-12 faths. (BMNH); Mauritius (ANSP). INDONESIA: Mentawai Island (USNM). PHILIPPINE ISLANDS: Tataan Island, 18 faths. (USNM); Loay, Bohol I. (BMNH). JAPAN: Osima, Osami (USNM). SOLOMON ISLANDS: Marau Sound, Guadalcanal (Gower coll.). LOYALTY ISLANDS: Lifu (IRS; USNM; AIM). NEW CALEDONIA: reef 12 mi. off Baie du Mondouze, Noumea (Cernohorsky coll.). FIJI ISLANDS: Kiaia Island (BPM). NIUE ISLAND: (Powell coll.; Clover coll.); Alofi (Cernohorsky coll.). COOK ISLANDS: Rarotonga (Garrett, 1873). LINE ISLANDS: Palmyra Island (USNM). SOCIETY ISLANDS: Tahiti (IRS); Moorea Island (USNM). TUAMOTU ISLANDS: Maia I., Tikahau; Makatea (both USNM). HAWAIIAN ISLANDS: Barber's Point, Oahu, 100 ft. (Cross coll.); off Makua, Oahu, 7-8 faths. (Burgess coll.); Kuaba, Oahu (DMNH); Waiane, Oahu; off Waikiki, Oahu, 10-15 ft.; Pupukea beach; Laysan Island (all USNM). MIDWAY ISLANDS: (USNM).

Mitra peculiaris Reeve, 1845 (Pl. 452)

Range—Indonesia to Polynesia.

Remarks—Tryon (1882) and Dautzenberg and Bouge (1923), consider *M. peculiaris* to be a monstrosity of *M. typha* Reeve. The two species are very similar indeed, but until more material of

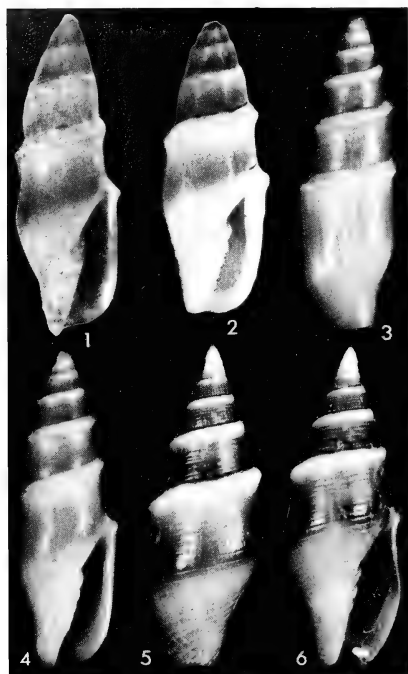


Plate 452. *Mitra (Strigatella) peculiaris* Reeve.

Fig. 1. Lectotype from Puerto Galero Mindoro, Philippine Ids. (BM (NH) 1967833; 11.0 x 3.5 mm).

Fig. 2. Syntype; broad form (BM (NH) 1967833; 10.0 x 3.6 mm).

Figs. 3, 4. Specimen from Bay of Islands, Suva Harbour, Fiji Ids.; adult specimen (Hill coll.; 14.2 x 4.6 mm).

Figs. 5, 6. Specimen from Suva reef, Fiji Ids.; immature specimen (WOC coll.; 9.5 x 3.4 mm).

M. peculiaris, particularly intermediate specimens connecting the two, are available, the species is tentatively accepted as valid. *M. peculiaris* differs from *M. typha* in the following features: it is more cylindrical, the whorls are slightly concave and angulate through the appearance of a distinct, elevated white keel at the su-

tures; this keel, although weak and obsolete, is also apparent on the centre of the body whorl in line with the aperture. The body whorl keel continues to the outer lip which appears angulate at the start, and then descends almost perpendicularly towards the base; a weak callosity is present within the lip in adult specimens. In size, sculpture, number of whorls, columellar folds and colour, the two species hardly differ.

Habitat—On reefs, under rocks and coral, on a sand and mud substratum, from the intertidal zone to a depth of 8 fathoms.

Measurements (mm)—

length	width	height of aperture	
14.2	4.7	6.7	Bay of Islands, Fiji Ids.
11.0	3.5	5.2	Lectotype of <i>peculiaris</i>
9.5	3.6	5.0	Suva reef, Fiji Ids.

Synonymy—

1845 *Mitra peculiaris* Reeve, *Conchologia Iconica*, vol. 2, pl. 36, fig. 305 (in error sp. 273) [Puerto Galero, Mindoro, Philippines]; 1874 Sowerby, *Thesaurus Conchyliorum*, vol. 4, p. 11, pl. 17, fig. 322; 1880 Garrett, *Journal of Conchology*, vol. 3, p. 23; 1923 Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 196; 1965 Cernohorsky, *Veliger*, vol. 8, p. 94, pl. 14, fig. 21.

1880 *Mitra humeralis* Garrett, *Journal of Conchology*, vol. 3, p. 18 (coast of Anaa I., Tuamotus).

1882 *Mitra typha* Reeve, Tryon, *Manual Conchology*, vol. 4, p. 128, pl. 37, fig. 116 (non Reeve, 1845).

1923 *Mitra typha* monst. *peculiaris* Reeve, Dautzenberg & Bouge, *Journal de Conchyliologie*, vol. 67, p. 96.

Types—Three syntypes of *M. peculiaris* Reeve, are in the British Museum (NH) no. 1967833, and the largest, 11.0 mm long specimen, is here selected as the lectotype. The type-specimen of *M. humeralis* Garrett, which used to be in the Godeffroy collection of the Hamburg Museum, has been destroyed during World War II. The type locality of *M. peculiaris* is Puerto Galero, Mindoro, Philippine Islands.

Records—INDONESIA: Pulau Siburu, N. of Sipora, S.W. Sumatra (USNM). PHILIPPINE ISLANDS: Lugbon I., Romblon (USNM); Puerto Galero, Mindoro (BMNH). NEW GUINEA: Siassi Island (Hinton coll.). NEW HEBRIDES: Teuma Bay, S. Efate I. (Dale coll.). LOYALTY ISLANDS: Lifu (Dautzenberg & Bouge, 1923). FIJI ISLANDS: off Naselesele Point, Taveuni (USNM); Bay of Islands, Suva harbour, S. Viti Levu (Hill coll.); main Suva reef, S. Viti Levu (Cernohorsky coll.). TUAMOTU ISLANDS: coast of Anaa Island (Garrett, 1880—as *M. humeralis*).

East Pacific—Caribbean *Strigatella**Mitra tristis* Broderip, 1836

(Pl. 453)

Range—Gulf of California to the Galápagos Islands and Ecuador.

Remarks—This moderately common, intertidal species is variable in form, sculpture and colouring. The slender form, which lacks the axial folds and has a broad, white or yellowish sutural band, has been described as *M. albofasciata* Sowerby, *M. jousseaumiana* Mabile, *M. dolorosa* Dall, and *M. salinasensis* Bartsch.

Habitat—On rocky shores, on a rock and sandy-silt substratum, from the intertidal zone to a depth of 12 fathoms.

Description—Shell up to 38 mm (about 1½ inches) in length, elongate-ovate, body whorl slender or broad, solid, sutures distinct, irregular and shallow. Whorls 5-7, apart from an eroded protoconch, spire whorls flat-sided or weakly convex, sculptured with irregular, broad and weak axial folds which usually weaken on the lower half of the body whorl and may be completely absent in some individuals; fine, almost smooth or minutely pitted or axially striate spiral grooves encircle the shell, striae more prominent at the shoulder of the whorls, numbering from 2-7 on the penultimate and from 1-4 at the shoulder of the body whorl, in addition to 8-12 oblique cords towards the base. Aperture longer than the spire, narrow and smooth within, outer lip thickened and occasionally weakly calloused within, margin of outer lip smooth apart from 3-4 very obsolete denticles anteriorly. Columella calloused, and with 4-5 oblique folds, siphonal canal short and straight, siphonal notch prominent. Olive-brown to dark brown in colour, ornamented with a narrow or moderately broad, white or yellowish-brown sutural band and occasionally a few pale streaks which descend from the sutures onto the band along the axial folds; aperture brown within, columellar folds bluish-white or light violet, parietal wall brown. Periostracum thin and brown in colour.

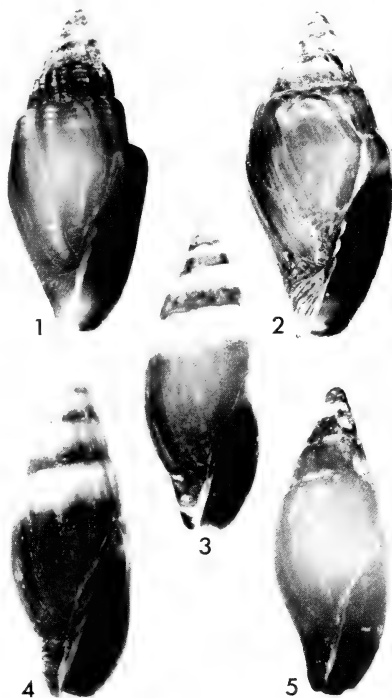
Measurements (mm)—

length	width	height of aperture	
34.0	14.9	20.0	Syntype of <i>tristis</i>
29.7	12.8	17.0	Lectotype of <i>tristis</i>
27.8	12.7	18.0	Holotype of <i>salinasensis</i>
27.8	11.6	16.0	Santa Cruz I., Galápagos

25.4	10.2	15.0	Puertecitos, Baja California
22.9	8.9	12.5	Holotype of <i>albofasciata</i>
21.0	10.2	13.7	Galápagos
20.2	7.5	11.0	Paratype of <i>jousseaumiana</i>
19.6	7.4	11.1	Holotype of <i>dolorosa</i>

Synonymy—

- 1836 *Mitra tristis* Broderip, Proc. Zool. Soc. London, pt. 3, p. 194 (Santa Elena and Galapagos I.); 1844 Reeve, Conchologia Iconica, vol. 2, pl. 15, fig. 114; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 21, pl. 21, fig. 446.
1839 *Mitra olivacea* Anton, Verz. Conchylien, p. 68 (California); 1839 Kuster, Syst. Conchylien-Cabinet, ed. 2, vol. 5, p. 73, pl. 13, figs. 15, 16.

Plate 453. *Mitra (Strigatella) tristis* Broderip.

- Fig. 1. Lectotype from St. Elena or Galapagos Ids.; broad form (BM (NH) 1966414; 29.7 x 12.8 mm).
Fig. 2. Holotype of *M. salinasensis* Bartsch from Salinas, Guayaquil, Ecuador; broad form, juvenile specimen (USNM 367982; 27.8 x 12.7 mm).
Fig. 3. Holotype of *M. albofasciata* Sowerby; slender form (BM (NH) 1906.5.8.54; 22.9 x 8.9 mm).
Fig. 4. Holotype of *M. dolorosa* Dall off Consag Rock, Gulf of California, 12 fms.; slender form (USNM 109009; 19.6 x 7.4 mm). [photo courtesy H. A. Rehder, USNM].
Fig. 5. Paratype of *M. jousseaumiana* Mabile from "California"; slender form (ex-coll. Mabile, IRSN; 20.2 x 7.5 mm).

- 1874 *Mitra albofasciata* Sowerby, Thesaurus Conchyliorum, vol. 4, p. 4, pl. 16, fig. 300 (South Africa = error!).
- 1882 *Mitra (Strigatella) tristis* Tryon, Manual Conchology, vol. 4, p. 155, pl. 45, fig. 329; 1894 Stearns, Proc. U.S. Nat. Museum, vol. 17, p. 177; 1939 Hertlein & Strong, Proc. Calif. Acad. Sciences, ser. 4, vol. 23, no. 24, p. 370; 1958 Keen, Sea shells trop. west America, p. 430, fig. 656; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 15, textfigs. 71, 72 (radulae); 1971 Keen, Sea shells trop. west America, ed. 2, p. 642, fig. 1429 (figured syntypes).
- 1898 *Mitra jousseaumiana* Mabile, Bull. Soc. Phil., vol. 9, p. 78 (no locality given; "Baïe California" on label with paratype).
- 1903 *Mitra dolorosa* Dall, Proc. Biol. Soc. Washington, vol. 16, p. 173 (off Consag Rock, Gulf of California, 12 fathoms); 1925, Proc. U.S. Nat. Museum, vol. 66, no. 17, p. 20, pl. 21, fig. 6; 1969 Wolfson, Veliger, vol. 11, p. 282, figs. 1-3 (egg-capsules).
- 1928 *Mitra salinasensis* Bartsch, Journ. Washington Acad. Sciences, vol. 18, no. 3, p. 68, fig. 16 (Salinas, Guayaquil, Ecuador) [juvenile specimen].
- 1958 *Mitra (Strigatella) dolorosa* Dall, Keen, Sea shells trop. west America, p. 429, fig. 654.
- 1966 *Strigatella tristis* (Broderip), Cernohorsky, Journal of Conchology, vol. 26, p. 16, fig. 1 (radula); 1967 J. Cate, Veliger, vol. 10, p. 194, pl. 19, fig. 6 (shell), textfig. 6 (radula).

Types—Three syntypes of *M. tristis* Broderip, are in the British Museum (NH) no. 1966414, and the smallest, 29.7 mm long specimen, is here selected as the lectotype; the holotype of *M. albofasciata* Sowerby, is in the same Institution, B.M. (NH) no. 1906.5.8.54. The holotype of *M. dolorosa* Dall, USNM no. 109009, and the holotype of *M. salinasensis* Bartsch, USNM no. 367982, are both in the National Museum of Natural History, Washington. The whereabouts of the type-specimen of *M. jousseaumiana* Mabile, are unknown, but a paratype, ex-Mabile collection, is in the Institut Royal des Sciences Naturelles, Brussels. The type-specimen of *M. olivacea* Anton, cannot be traced. Broderip cited two localities for *M. tristis*, and the first-mentioned locality of Santa Elena [Ecuador], is designated as the type locality.

Records—BAJA CALIFORNIA: Cape San Lucas; San José Island; Agua Verde Bay; San Carlos Bay (all USNM); Santa Rosalia, San Marcos I. (ANSP); Puertecitos (Cernohorsky coll.); off Consag Rock, 31°05'N & 114°29'W, 12 faths. (USNM). MEXICO: Puerto Lobos (Cernohorsky coll.); Puerto Libertad, Sonora (ANSP); S.W. corner of Puerto San Carlos (USNM); Guaymas (DMNH; Clover coll.); Saladita Bay, Guaymas, 20 ft.; rock shores S. of Chile Point, W. Mazatlan; Venado I., N.W. of Mazatlan; North beach, Mazatlan (all ANSP); Sinaloa, Mazatlan (DMNH; USNM); Acapulco (USNM; ANSP). NICARAGUA: San Juan del Sur (USNM). COSTA RICA: San Lucas Island (USNM); N. side of Bahía de Culebra, 3-7 ft.; Chatham Bay, Cocos I. (both ANSP). PANAMA: Taboga Island (USNM; ANSP); San José I.; Perlas I.; Venado Island (both USNM). GALAPAGOS ISLANDS: Duncan Island; Hood Island; James Island; Turtle Bay, Santa Cruz I. (all USNM); Darwin Bay, Tower I.; Seymour Bay, indefatigable I.; Gardner Bay, Hood I. (all ANSP). COLOMBIA: Port Utria (USNM). ECUADOR: Morro Jaramijo (USNM; ANSP); between Manglaralto and Manta; Salinas, Guayaquil (both USNM); Santa Elena (BMNH).

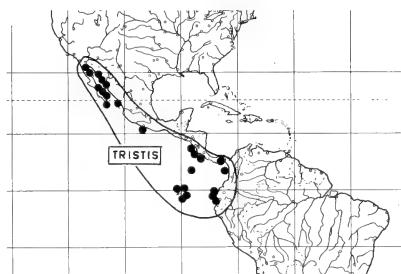


Plate 454. Geographical distribution of *Mitra (Strigatella) tristis* Broderip.

Fossil records—PLEISTOCENE: S. Seymour Island, Galapagos Islands (Hertlein & Strong, 1939).

Mitra mesolia Pilsbry and Johnson, 1917 (Pl. 455)

Range—Miocene of the Dominican Republic.

Remarks—This is the sole representative, fossil or living, of the subgenus *Strigatella* in the Caribbean. The original description is as follows:

"The shell is short and stout. Sculpture of a few impressed spiral lines on the upper part of the whorl and spire, 6 on the penult whorl, the anterior end having about 9 low spiral ridges, with faint traces of spirals above them, the middle part of the last whorl being smooth. Lip thickened within in the lower three-fourths, smooth; 4 columellar plaits." Length 20.0 mm (apical whorls wanting), width 9.5 mm.

Synonymy—

1917 *Mitra mesolia* Pilsbry & Johnson, Proc. Acad. Nat. Sci. Philadelphia, vol. 68, p. 166 (Santo Domingo, Dominican Republic, Miocene; holotype in Academy of Natural Sciences, Philadelphia, no. 3275); 1922 Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 73, pt. 2, p. 341, pl. 24, fig. 10 (figured holotype).



Plate 455. *Mitra (Strigatella) mesolia* Pilsbry and Johnson. Holotype from Santo Domingo, Miocene of the Dominican Republic (from Pilsbry, 1922, pl. 24, fig. 10; 20.0 x 9.5 mm).

Subgenus *Sohlia* Cernohorsky, 1970Type: *Mitra conoidea* Matheron, 1843

Species of the subgenus are moderately small, not exceeding 30 mm (1¼ inches) in length, coniform, with a short and concave or flat-sided spire and a long aperture; sculpture consists of spiral threads on the spire whorls, and the body whorl is usually smooth. The outer lip is moderately thin and simple and the columella has from 3-5 oblique folds which are positioned either at the centre or the anterior of the columella; the siphonal canal is straight and the siphonal notch is shallow.

Sohlia was originally described as a subgenus of *Imbricaria* Schumacher, but examination of the radula of *M. carbonacea* (Hinds), a species similar to *M. conoidea*, proved the species to belong to the Mitrinae. The subgenus includes 2 species and 1 subspecies from the Cretaceous and Pleistocene of Europe, and occurs living in West Africa.

Synonymy—

1970 *Sohlia* Cernohorsky, Bull. Auckland Inst. Museum, no. 8, pp. 28, 44; type-species by original designation *Mitra conoidea* Matheron, 1843 (as a subgenus of *Imbricaria* Schumacher, 1817).

***Mitra conoidea* Matheron, 1843**

(Pl. 456)

Range—Upper Cretaceous of France.

Remarks—The species is coniform, with a short and concave spire, a long and narrow aperture and



Plate 456. *Mitra (Sohlia) conoidea* Matheron. Port de Figuières, U. Cretaceous of France (from Matheron, 1843, pl. 40, fig. 19; 26.0 x 10.0 mm).

3 columellar folds which are positioned fairly low on the pillar; sculpture is almost absent, apart from fine longitudinal striae, and the siphonal notch is shallow. Length 26.0 mm, width 10.0 mm.

Synonymy—

1843 *Mitra conoidea* Matheron, Cat. méthodique & desc. corps organ. fossiles Départ. Bouches-du-Rhône, Marseille, p. 253, pl. 40, figs. 19, 20 (Port de Figuières, France; U. Cretaceous); 1843, Rep. trav. Soc. stat. Marseille, vol. 6, p. 325.
1970 *Imbricaria (Sohlia) conoidea* (Matheron), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 74, pl. 5, fig. 7.

***Mitra carbonacea* subspecies
carbonacea (Hinds, 1844)**

(Pl. 457; pl. 458, figs. 1-6)

Range—Senegal to Angola, West Africa.

Remarks—The species has been generally assigned to the genus *Imbricaria* Schumacher, on the basis of shell-characters. A recent examination of a live-collected specimen shows the radula to be typically mitrine.

Habitat—On a gravel substratum, from 8 to 11 fathoms.

Description—Shell up to 30 mm (about 1¼ inches) in length, coniform, solid, spire very short and concave, sutures distinct, irregular and narrowly channeled. Spire whorls flat-sided, last 2-3 whorls occasionally convex, sculptured with spiral threads which number from 2-6 on the penultimate whorl but become obsolete on the body whorl, with the exception of 12-18 oblique cords at the base. The spiral threads are bisected by very fine axial striae which render the spiral grooves minutely pitted, and generally become obsolete on the shoulder of the last whorl; axial growth-striae are generally present on the body whorl. Aperture longer than the spire, narrow and elongate and parallel to the columella, smooth within; outer lip moderately thickened and smooth. Columella weakly calloused, callus more prominent anteriorly and with 5-6 oblique folds; siphonal fasciole straight, siphonal notch shallow. Brown in colour, generally with a yellowish zone near the body whorl suture and paler brown on the spire whorls, covered with a dark brown periostracum;

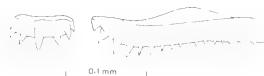


Plate 457. *Mitra (Sohlia) carbonacea* (Hinds). Half-row of radula. Gorée, Senegal, West Africa, 16-20 m.

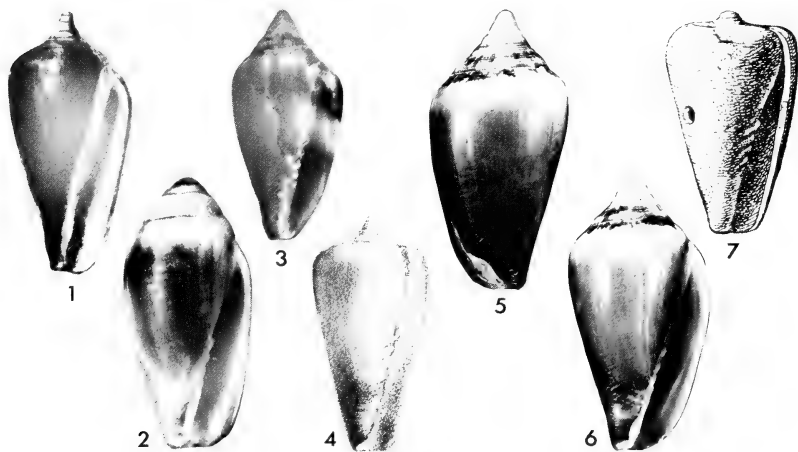


Plate 458. Figs. 1-6. *Mitra (Sohlia) carbonacea carbonacea* (Hinds). Fig. 7. *M. (S.) carbonacea caterinii* Meneghini.

Fig. 1. Lectotype figure of *M. (S.) carbonacea carbonacea* (Hinds) (from Hinds, 1844, pl. 11, fig. 10).

Fig. 2. Lectotype of *M. citrina* Reeve; senile specimen (BM (NH) 1967719; 23.6 x 11.5 mm).

Fig. 3. Syntype of *M. citrina* Reeve (BM (NH) 1967719; 17.5 x 8.7 mm).

Fig. 4. Type specimen of *M. rollandi* Bernardi (from Bernardi, 1853, pl. 2, fig. 7; 28.0 x 15.0 mm).

Figs. 5, 6. Specimen from Bay of Rufisque, Senegal, West Africa (WOC coll.; 19.7 x 10.0 mm).

Fig. 7. Type specimen of *Imbricaria mochii* Blanc from Buca dei Corvi, Castiglione, Livorno, Pleistocene of Italy (from Blanc, 1934, textfig. 1; 17.5 x 10.6 mm).

aperture bluish-white or greyish-brown, columella bluish-white.

Measurements (mm)—

length	width	height of aperture	
28.0	15.0	—	Type of <i>rollandi</i>
26.6	13.0	21.4	Corée, Senegal
23.6	11.5	18.5	Lectotype of <i>citrina</i>
20.2	10.3	17.0	Corée, Senegal

Synonymy—

1844 *Imbricaria carbonacea* Hinds, Zoology voyage Sulphur, Mollusca, pt. 2, p. 41, pl. 11, figs. 9, 10 (L'Agulhas Bank, Cape of Good Hope, Sth. Africa = error!) [October 1844]; 1882 Tryon, Manual Conchology, vol. 4, p. 199, pl. 58, figs. 676, 677; 1910 Dautzenberg, Act. Soc. Linn. Bordeaux, p. 47; 1912, Ann. L'Institut. Monaco, vol. 3, p. 28; 1947 Nicklès, Inst. Française d'Afrique Noire, p. 11; 1956 Knudsen, Atlantide Report, no. 4, p. 70; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 43.

1844 *Mitra citrina* Reeve, Conchologia Iconica, vol. 2, pl. 27, figs. 215a, b (no locality given) [December, 1844]; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 15, pl. 18, fig. 357.

1844 *Mitra carbonacea* Hinds, Reeve, Conchologia Iconica, vol. 2, pl. 27, fig. 217; 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 15, pl. 18, fig. 356; 1972 Cernohorsky, Records Auckland Inst. Museum, vol. 9, p. 197, fig. 5 (shell) and 7 (radula).

1853 *Mitra rollandi* Bernardi, Journal de Conchyliologie, vol. 4, p. 67, pl. 2, figs. 6, 7 (no locality given); 1874 Sowerby, Thesaurus Conchylorum, vol. 4, p. 15, pl. 26, fig. 604.

Types—The whereabouts of the types of *M. carbonacea* (Hinds) and *M. rollandi* Bernardi, are unknown. The lectotype, here designated, and 3 syntypes of *M. citrina* Reeve, are in the British Museum (NH) no. 1967719; the lectotype has the usually subangulate shoulder worn down, but the 3 remaining syntypes are typical representatives of *M. carbonacea*. Hinds gave Agulhas Bank, Cape of Good Hope, Sth. Africa as the type locality, but the species does not occur in South African waters, nor has it been recorded from that region according to Barnard (1959). We therefore designate Port Etienne, Senegal, West Africa, as the type locality of *M. carbonacea*; this is the first correct locality reported by Dautzenberg (1910).

Records—SENEGAL: Bay of Rufisque (IRS): Corée, 16-20 m (ZMC); between Corée and Tiara, 15 m (ZMC); Port Etienne (Dautzenberg, 1910). ANGOLA: Mossamedes (Dautzenberg, 1910).

***Mitra carbonacea* subspecies
caterinii Meneghini, 1868**
(Pl. 458, fig. 7)

Range—Pleistocene of Italy.

Remarks—The Italian Pleistocene subspecies *caterinii* is a precursor of the Recent West African *M. carbonacea* (Hinds), and was probably well established in southern Europe prior to the Pleistocene. During the cooling of temperatures in the Mediterranean in the glacial period, the species emigrated to warmer latitudes of Northwest Africa where it still survives. The fossil subspecies is almost inseparable from the living *M. carbonacea*, but in view of its geological history, former occurrence in the Mediterranean and extinction in that region during the Post-Pleistocene, it has been retained as a subspecies. The variability of the form of the spire, which is usually pointed and flat-sided or slightly convex in senile specimens and depressed and concave in younger individu-

als, prompted a re-description of the Pleistocene fossil as *Imbricaria mochii* by Blanc. The subspecies *caterinii* will attain a length of 35.0 mm (about 1½ inches).

Measurements (mm)—

length	width	
29.5	14.5	Type-specimen of <i>caterinii</i>
34.7	17.3	Livorno, Pleistocene
17.5	10.6	Holotype of <i>mochii</i>

Synonymy—

- 1868 *Mitra caterinii* Meneghini, Brochure, Livorno, p. 1, pl. 1 (Darsena, Livorno, Italy, Pleistocene; type-specimen in Museo di Storia Naturale, Livorno).
 1934 *Imbricaria caterinii* Meneghini, Blanc, Atti Soc. Toscana Sci. Nat. Proc. Verbal, Pisa, vol. 43, no. 4, p. 100 (synonymizes *M. caterinii* with *M. rollandi* Bernardi).
 1934 *Imbricaria mochii* Blanc, Atti Soc. Toscana Sci. Nat. Proc. Verbal, Pisa, vol. 43, no. 4, p. 97, fig. 1 and fig. 2, subfig. 5 (Buca dei Corvi, Castiglioncello, Livorno, Italy, Pleistocene; type specimen in Geological Institute, University of Pisa).
 1970 *Imbricaria carbonacea caterinii* (Meneghini), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 43.

[These occasional blank areas occur between genera and subgenera to permit the insertion of new material and future sections in their proper systematic sequence.]

Genus *Dentimitra* von Koenen, 1890Type: *Mitra circumcisa* Beyrich, 1854

Species of the genus are small, rarely exceeding 20.0 mm (about $\frac{3}{4}$ inches) in length, fusiformly-elongate or fusiformly-ovate, spire whorls are flat-sided or convex and the protoconch is small and conical and the sutures are distinct. The aperture is about equal in height to the spire and moderately wide, smooth within, the outer lip is thin and simple, constricted anteriorly and frequently angulate at its anterior third; the columella has 3-5 thin or thick, oblique and somewhat distant folds, with the first posterior fold more prominent than the succeeding folds. The siphonal canal is straight, occasionally calloused, and the siphonal notch is usually shallow.

Species of *Dentimitra* are confined to Paleocene-Oligocene deposits of Europe, southern United States and Indonesia. They resemble species of *Conomitra* Conrad, in the family Volutomitridae, but differ in features of small and conical protoconch, disposition of columellar folds (in *Conomitra* the first posterior fold is shorter than the second succeeding one), and absence of axial folds. The correct allocation of *Dentimitra* is often difficult to achieve on the basis of poorly drawn figures and badly preserved specimens, and the list of species given is therefore only tentative.

Synonymy—

- 1890 *Dentimitra* von Koenen, Abh. kön. Preuss. geol. Landesanstalt, vol. 10, pt. 2, p. 529; type-species by subsequent designation (Cernohorsky, 1970): *Mitra circumcisa* Beyrich, 1854. Germany; Oligocene.
1931 *Puruiana* K. Martin, Meded. Mijnb. Nederl.-Indie, no. 18, p. 19; type-species by monotypy *Mitrolumna* (*Puruiana*) *rustica* K. Martin, 1931. Indonesia; U. Eocene.

***Dentimitra circumcisa* (Beyrich, 1854)**

(Pl. 459, figs. 1, 2)

Range—Lower Oligocene of Germany.**Synonymy—**

- 1854 *Mitra circumcisa* Beyrich, Zeit. Deut. geol. Gesellschaft, vol. 6, pt. 2, p. 417, pl. 9, figs. 4a, b (Osterweddingen, Magdeburg, Germany, L. Oligocene; 7.0 x 3.6 mm); 1890 von Koenen, Abh. kön. Preuss. geol. Landesanstalt, vol. 10, pt. 2, p. 544, pl. 36, figs. 12 a-c.
1970 *Dentimitra circumcisa* (Beyrich), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 41, pl. 4, fig. 9.

***Dentimitra impressa* (von Koenen, 1890)**

(Pl. 459, fig. 3)

Range—Lower Oligocene of Germany.

Remarks—The specific name is a primary homonym of *M. impressa* Anton, 1839, and Reeve, 1844.

Synonymy—

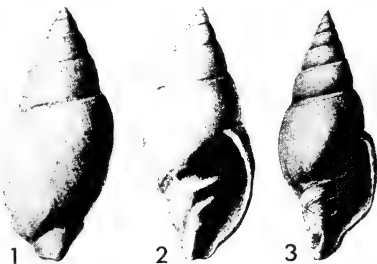
- 1890 *Mitra impressa* von Koenen, Abh. kön. Preuss. geol. Landesanstalt, vol. 10, pt. 2, p. 543, pl. 36, figs. 10a-c (Osterweddingen and Lattorf, Germany, L. Oligocene; 14.4 x 6.1 mm) [non *Mitra impressa* Anton, 1839].
1970 *Dentimitra impressa* (Koenen), Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 41, pl. 4, fig. 10 [non *Mitra impressa* Anton, 1839].

Dentimitra rhenana* (Görge, 1941)*Range—**Upper Oligocene of Germany.**Synonymy—**

- 1941 *Mitra rhenana* Görge, Decheniana, vol. 100A, p. 137, pl. 1, figs. 3, 4 (Rumeln, niederrhein, Germany, U. Oligocene; type-specimen in Senckenberg Museum, Frankfurt a.M.).

Dentimitra tenuis* (Beyrich, 1854)*Range—**Oligocene of Germany and Holland.**Synonymy—**

- 1854 *Mitra tenuis* Beyrich, Zeit. Deut. geol. Gesellschaft, vol. 6, pt. 2, p. 416, pl. 9, figs. 3a, b (Westeregeln, Magdeburg, Germany, L. Oligocene; 8.0 x 2.5 mm); 1865 von Koenen, Zeit. Deut. geol. Gesellschaft, vol. 17, p. 505; 1890, Abh. kön. Preuss. geol. Landesanstalt, vol. 10, pt. 2, p. 542.
1950 *Pusia* (*Pustolina*) *tenuis* (Beyrich), Beets, Meded. geol. Stichting, ser. C, vol. 4, no. 8, p. 30, pl. 3, figs. 26-31 (Peel district, Holland; Oligocene).

Dentimitra quinqueplicata* (Ravn, 1902)*Range—**Paleocene of Denmark.Plate 459. European Tertiary *Dentimitra*.

Figs. 1, 2. *Dentimitra circumcisa* (Beyrich). Specimen from Westeregeln, L. Oligocene of Germany (from von Koenen, 1890, pl. 36, figs. 12b, c; 9.2 x 4.4 mm).

Fig. 3. *D. impressa* (von Koenen) [non Anton]. Holotype from Lattorf, L. Oligocene of Germany (from von Koenen, 1890, pl. 36, fig. 10; 14.4 x 6.1 mm).

Synonymy—

- 1902 *Mitra quinqueplicata* Ravn, Moll. Danm. Kridtaf., vol. 2, p. 232, pl. 2, figs. 21, 22 (Faxe, Denmark; Paleocene).
 1933 *Mitra (Volutomitra) quinqueplicata* Ravn, Mem. Acad. Roy. Sci. Nat. Danm., vol. 5, pt. 2, p. 64.

Dentimitra dilatata (Briart and Cornet, 1871)

Range—Paleocene of Belgium.

Synonymy—

- 1871 *Mitra dilatata* Briart & Cornet, Mem. Acad. Roy. Soc. Lett. Art Belg., vol. 36, p. 73, pl. 5, figs. 12a, b (Calcaire grossiere de Mons, Belgium, Paleocene; 26.0 x 12.5 mm).

Dentimitra crenifunata (Cossmann, 1896)

Range—Eocene of France.

Synonymy—

- 1896 *Mitra crenifunata* Cossmann, Ann. Soc. Roy. Malac. Belg., vol. 31, p. 39, pl. 2, figs. 12, 13 (Chambors, Paris Basin, France, Eocene; 6.5 x 3.0 mm).

Dentimitra degrangei (Oppenheim, 1906)

Range—Eocene of France.

Synonymy—

- 1906 *Mitrid degrangei* Oppenheim, Zeit. Deut. geol. Gesellschaft, vol. 58, p. 89, pl. 9, figs. 4a, b (Biarritz, nummulitique zone, France, Eocene; 13.0 x 4.0 mm).

Dentimitra obesa (F. E. Edwards, 1856)

Range—Eocene of England.

Remarks—The specific name is a primary homonym of *Mitra obesa* Reeve, 1844.

Synonymy—

- 1856 *Mitra obesa* F. E. Edwards, Palaeont. Soc. Monograph, pt. 3, no. 2, p. 185, pl. 24, figs. 4a-d (Highcliff, Lower Barton beds, England, U. Eocene; holotype in the Department of Palaeontology, British Museum (NH) no. G-71191, length 9.0 mm) [non *M. obesa* Reeve, 1844].

Dentimitra cretacea (Gabb, 1864)

Range—Eocene of California, United States.

Synonymy—

- 1864 *Mitra cretacea* Gabb, Palaeontology Geol. Surv. California, vol. 1, p. 103, pl. 28, fig. 215 (Martinez, Martinez formation, California, Eocene; 9 x 4 mm); 1869, Palaeontology Geol. Surv. California, vol. 2, pp. 158, 221; 1927 Stewart, Proc. Acad. Nat. Sci. Philadelphia, vol. 78, p. 406, pl. 27, figs. 9, 10 (figured holotype).

- ?1939 *Uromitra* (?) *cretacea* (Gabb), Vokes, Ann. New York Acad. Sciences, vol. 38, p. 134, pl. 18, fig. 19 (Domengine formation, California; U. Eocene).

Dentimitra simplicissima (Cooper, 1894)

(Pl. 460, fig. 1)

Range—Eocene of California, United States.

Synonymy—

- 1894 *Mitra simplicissima* Cooper, California State Min. Bur. Bulletin, vol. 4, p. 45, pl. 2 (Rose Canyon, Coalinga, Domengine formation, California, M. Eocene; typespecimen in California Academy of Sciences); 1915 Dickerson, Proc. Calif. Acad. Sciences, ser. 4, vol. 5, no. 3, p. 75, pl. 11, fig. 12 (figured syntype); 1926 Clark, Univ. California Publ. Geol. Sci., vol. 16, p. 116 (La Jolla formation, California; M. Eocene).

Dentimitra murietta (Anderson and Hanna, 1925)

(Pl. 460, figs. 2, 3)

Range—Eocene of California, United States.

Synonymy—

- 1925 *Mitra murietta* Anderson & Hanna, Occas. Pap. California Acad. Sciences, vol. 11, p. 76, pl. 8, figs. 12, 13 (Grapevine Creek, Tejon formation, California, U. Eocene; holotype in California Academy of Sciences, no. 834; 14.2 x 7.3 mm).

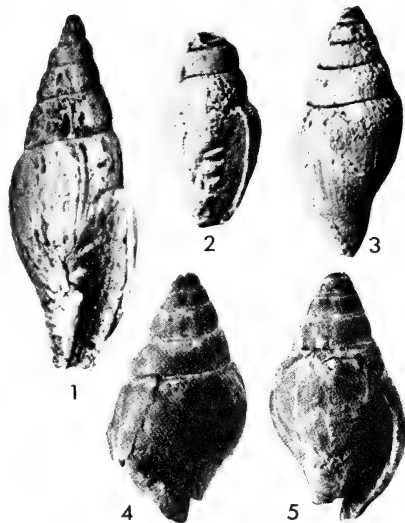


Plate 460. American Tertiary *Dentimitra*.

Fig. 1. *Dentimitra simplicissima* (Cooper). Syntype from Rose Canyon, Domengine formation, M. Eocene of California (from Dickerson, 1915, pl. 11, fig. 12; c. 17.0 mm).

Figs. 2, 3. *D. murietta* (Anderson and Hanna). Grapevine Creek, Tejon formation, U. Eocene of California (from Anderson & Hanna, 1925, pl. 8, figs. 12, 13; fig. 2 = holotype, 14.2 x 7.3 mm; fig. 3 = paratype, c. 18.5 mm).

Figs. 4, 5. *D. clementensis* (Hanna). Holotype from San Clemente Creek, La Jolla formation, M. Eocene of California; juvenile specimen (from Hanna, 1927, pl. 52, figs. 11, 12; 7.5 x 4.0 mm).

***Dentimitra clementensis* (Hanna, 1927)**

(Pl. 460, figs. 4, 5)

Range—Eocene of California, United States.**Synonymy**—

1927 *Mitra clementensis* Hanna, Univ. California Publ. Geol. Sci., vol. 16, no. 8, p. 320, pl. 52, figs. 11, 12 (San Clemente Creek, La Jolla formation, California, M. Eocene; type-specimen in University of California, no. 30991; 7.5 x 4.0 mm) [juvenile specimen].

Dentimitra marylandica* (Clark, 1896)*Range**—Paleocene of Maryland, United States.**Synonymy**—

1895 *Mitra marylandica* Clark, J. Hopkins Univ. Circ., vol. 15, p. 4 (*nomen nudum*).

1896 *Mitra marylandica* Clark, U.S. Geol. Surv. Bulletin, no. 141, p. 66, pl. 11, figs. 4a, b (Pomonkey Neck, Aquian formation, Maryland, Paleocene; type specimen in Geological Survey, National Museum of Natural History, Washington); 1901, Clark & Martin, Maryland Geol. Surv. Bulletin, p. 132, pl. 21, figs. 9, 9a.

***Dentimitra columbellaformis* (K. Martin, 1931)**

(Pl. 461, figs. 1-2)

Range—Upper Eocene of Java, Indonesia.

Remarks—The species name is preoccupied by *M. columbellaformis* Reeve, 1844, an unjustified emendation of *M. colombelliformis* Kiener (art. 19 and 33 (a) (ii) of ICZN). No substitute name is proposed, since *Dentimitra rustica* (Martin), may prove to be a juvenile specimen of the same species.

Synonymy—

1931 *Mitra columbellaformis* K. Martin, Wet. Meded. Dienst Mijnb. Nederl.-Indies, no. 18, p. 18, pl. 3, figs. 5, 5a (Kali Puru, Nanggoelan beds, Java, Indonesia, U. Eocene; type-specimen in Rijksmuseum, Leiden, length 12.0 mm). [non Reeve, 1844].

***Dentimitra rustica* (K. Martin, 1931)**

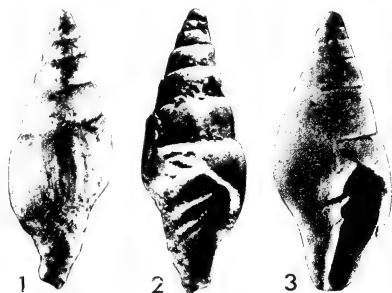
(Pl. 461, fig. 3)

Range—Upper Eocene of Java, Indonesia.

Remarks—The type-specimen is a juvenile with only 2 developed columellar folds, and may be conspecific with the preoccupied *D. columbellaformis* (Martin).

Synonymy—

1931 *Mitrolumna (Puruana) rustica* K. Martin, Weten. Meded. Mijnb. Nederl.-Indie, no. 18, p. 19, pl. 3, figs. 7, 7a (Kali Puru, Nanggoelan beds, Java, Indonesia, U. Eocene; type-specimen in Rijksmuseum, Leiden, length 14.0 mm); 1970 Chernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 40, pl. 4, fig. 11.

Plate 461. Indonesia Tertiary *Dentimitra*.

Figs. 1, 2. *Dentimitra columbellaformis* (K. Martin) [non Reeve]. Kali Puru, Nanggoelan beds, U. Eocene of Java (from K. Martin, 1931, pl. 3, figs. 5, 5a; 12.0 mm).

Fig. 3. *D. rustica* (K. Martin). Kali Puru, Nanggoelan beds, U. Eocene of Java; juvenile specimen (from K. Martin, 1931, pl. 3, fig. 7; 14.0 mm).

***Paleofusimitra elongata* Sohl, 1963**

(Pl. 462)

Range—Upper Cretaceous of Alabama, Mississippi and Georgia, S.E. United States.

Remarks—The diagnosis for the genus is applicable to the species.

Measurements (mm)—

length	width	height of aperture	
35.0	10.0	—	Pleasant Ridge Lake, Mississippi
28.2	8.4	—	Paratype of <i>elongata</i>
20.7	6.3	9.8	Holotype of <i>elongata</i>

Genus *Paleofusimitra* Sohl, 1963

Type: *Paleofusimitra elongata* Sohl, 1963

The single species of the genus is moderately small, not exceeding 35 mm (about 1½ inches) in length, fusiform and elongate, whorls *c.* 7, apart from 2½ smooth nuclear whorls, initial whorl nipple-like, spire whorls flatly convex. Sculpture consists of spiral striae which are confined to an area near the sutures, early whorls obsoletely costate. Aperture about equal in height to the spire, narrow, constricted anteriorly and smooth within, outer lip thin and simple. Columella with 2 weak and distant folds, anterior fold situated on the angular part of the columella; siphonal canal produced, narrow and spout-shaped, probably lacking a siphonal notch.

The genus is monotypic and represented by only the type-species from Upper Cretaceous deposits of the S.E. United States. The genus, if really belonging to the Mitridae, is the most primitive mitrid genus which retains strong fascioliid features. The outline of the columella, i.e. concave parietal wall, almost denticle-like angulation prior to an outward descend, placement and number of columellar folds and probably notchless siphonal canal, are all features reminiscent of the Fascioliidae. It is debatable whether *Paleofusimitra* is an ancestral stock of the American *Fusimitra*, or a fascioliid genus with weak mitrid features.

Synonymy—

1963 *Paleofusimitra* Sohl, Journal of Paleontology, vol. 37, no. 4, p. 750; type-species by original designation *P. elongata* Sohl, 1963. S.E. United States; U. Cretaceous.

Synonymy—

1963 *Paleofusimitra elongata* Sohl, Journal of Paleontology, vol. 37, no. 4, p. 750, pl. 89, figs. 11-15 (Locality 6, Ripley formation, *Exogyra costata* zone, Mississippi, S.E. United States; U. Cretaceous); 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 39, pl. 4, fig. 6.

Types—The holotype is in the Geological Survey, National Museum of Natural History, Washington, no. 130468.



Plate 462. *Paleofusimitra elongata* Sohl. Holotype from Ripley formation, Mississippi, U. Cretaceous of the S.E. United States (U.S. Geol. Surv. USNM 130468; 20.7 x 6.3 mm).

Genus *Charitodoron* Tomlin, 1932

Type: *Columbella barbara* Thiele, 1925

Shell up to 35 mm (about 1½ inches) in length, fusiformly-elongate or elongate-ovate, thin and fragile, sutures narrow and deeply incised; teleoconch of 4½-8 convex whorls, protoconch large, smooth and mamillate and consisting of 1½-2½ nuclear whorls. Moderately smooth or sculptured with punctate spiral striae, flat cords or axial riblets. Aperture moderately narrow, shorter than the spire, smooth within, outer lip thin, convex and simple, columella thinly calloused and completely without folds; siphonal canal straight or recurved, siphonal notch distinct or shallow. Colour of shell, pale yellow or fawn under a yellowish or yellowish-brown periostracum.

This is the only mitrid genus with a large, mamillate protoconch and a plaitless columella. Thiele (1925) described new species of *Charitodoron* in the genus *Columbella* and Tomlin (1932) erected the genus *Charitodoron* which he assigned to the family Buccinidae on conchological grounds. Barnard (1960), examined the radula of *Charitodoron thalia* Tomlin, and found the radula to be mitrine; in addition, the animal is said to lack eyes. *Charitodoron* contains only 3 species which are confined to deep water in South Africa.

Synonymy—

1932 *Charitodoron* Tomlin, *Annals Sth. African Museum*, vol. 30, p. 167; type-species by original designation: *C. euphrosyne* Tomlin, 1932 [= *Columbella barbara* Thiele, 1925].

Charitodoron barbara (Thiele, 1925)

(Pl. 463)

Range—South Africa.

Habitat—From 85 to 700 fathoms (all specimens collected dead).

Description—Shell up to 35 mm (about 1½ inches) in length, fusiformly-elongate, thin and fragile, sutures distinct and sharply incised. Whorls 5-7, apart from a protoconch of 1½-2½ large, smooth and mamillate nuclear whorls, spire whorls convex or almost flat-sided in younger specimens. First 3-4 post-nuclear whorls clathrate through bisecting, slender axial and spiral

threads, axial sculpture fading out on the last 2 whorls. On the penultimate and last whorl the sculpture consists of deeply punctate spiral grooves which number from 7-9 on the penultimate and up to 12 on the body whorl; in addition there are up to 20 spiral threads on the lower third of the body whorl. Aperture equal in height or

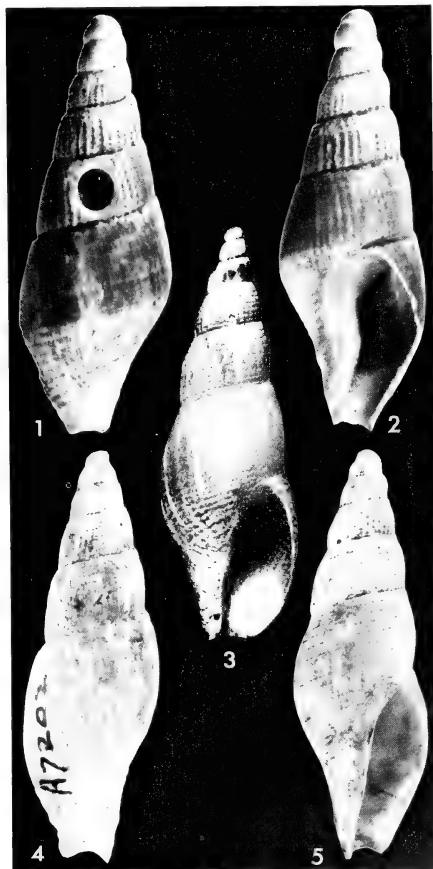


Plate 463. *Charitodoron barbara* (Thiele).

Figs. 1, 2. Holotype from Agulhas Bank, Sth. Africa, 155 m; juvenile specimen (ZMB Moll. 101680; 10.8 x 4.0 mm) [photo courtesy of R. Kilias, ZMB].

Fig. 3. Holotype of *Charitodoron euphrosyne* Tomlin from off Cape Point, Sth. Africa, 660-700 fms. (from Tomlin, 1932, textfig. 8; 27.0 x 9.0 mm).

Figs. 4, 5. Specimen from off Cape Point, Sth. Africa, 660-700 fms. (BM (NH) A-7202; fig. 4 + 27.4 x 9.1 mm; fig. 5 = 27.4 x 9.5 mm).

shorter than the spire, smooth within, outer lip thin, simple and convex; columella weakly caloused and smooth, straight or recurved, siphonal notch distinct or shallow, siphonal canal slightly produced and straight. Fawn or light yellow, occasionally with nebulous brown streaks under a pale yellow or yellowish-fawn periostracum, aperture white.

Measurements (mm)—

length	width	height of aperture	
27.4	9.5	12.2	Off Cape Point, Sth. Africa
27.0	9.0	11.0	Holotype of <i>euphrosyne</i>
10.8	4.0	6.0	Holotype of <i>barbara</i>

Synonymy—

- 1925 *Columbella barbara* Thiele, Wissen. Ergeb. Deut. Tiefsee-Exp. "Valdivia", vol. 17, p. 139, pl. 18, fig. 22 (Agulhas Bank, Sth. Africa, 155 m) [juvenile specimen].
 1932 *Charitodoron euphrosyne* Tomlin, Annals Sth. African Museum, vol. 30, pt. 2, p. 167, textfig. 8 (off Cape Point, Sth. Africa, 660-700 fms); 1959 Barnard, Annals Sth. African Museum, vol. 45, p. 145, 1960, Journal of Conchology, vol. 24, no. 11, p. 402; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 40, pl. 4, fig. 8.

Types—The holotype, a juvenile specimen, of *C. barbara* (Thiele), is in the Zoological Museum, Humboldt-University, Berlin, no. ZMB Moll. 101680. The holotype and 1 paratype of *C. euphrosyne* Tomlin, are in the South African Museum, Cape Town, no. A-3441. The type locality of *C. barbara* is Agulhas Bank, Sth. Africa, Lat. 35°16'S and Long. 22°26.7'E, in 155 m.

Records—SOUTH AFRICA: off Cape Point, 660-700 faths. (BMNH; SAM); Agulhas Bank, 155 m (ZMB); off west coast of Cape Peninsula and S.W. of Cape Point, 130-210s. (Barnard, 1959).

Charitodoron agulhasensis (Thiele, 1925)

(Pl. 464)

Range—South Africa.

Remarks—The species is very closely related to *C. barbara*, and has been separated on the basis of more slender, spindle-shaped form, smooth appearance and a thicker and more yellowish periostracum. Thiele described his species as having 8-9 whorls, the holotype of *C. aglaia* Tomlin, has 9 whorls and a specimen in the British Museum (NH) has only 7 whorls and a protoconch of 2 mamillate nuclear whorls. In the holotype of *C. agulhasensis* only the first post-nuclear whorl is clathrate, in the holotype of *C. aglaia* 3½ post-nuclear whorls are clathrate and in the specimen in the British Museum (NH) 4 post-nuclear whorls are clathrate. Usually the last 2½ whorls are smooth, apart from feeble axial growth-striae and

up to 20 oblique cords on the lower third of the body whorl. In all other respects the two species are very similar, and when more specimens will become available for examination, intergrading specimens connecting *C. agulhasensis* with *C. barbara* may come to light.

Habitat—From 80 to 200 fathoms.

Measurements (mm)—

length	width	height of aperture	
31.0	10.0	—	Syntype of <i>aglaia</i>
26.3	8.0	12.0	Holotype of <i>agulhasensis</i>



Plate 464. *Charitodoron agulhasensis* (Thiele).

Figs. 1, 2. Holotype from Agulhas Bank, Sth. Africa, 155 m (ZMB Moll. 101678; 26.3 x 8.0 mm) [photo courtesy of R. Kilias, ZMB].

Fig. 3. Holotype of *Charitodoron aglaia* Tomlin (from Tomlin, 1932, textfig. 9; 26.0 x 8.0 mm).

Fig. 4. Specimen from Cove Rock, East London, Sth. Africa, 80-130 fms. (BM (NH); 23.5 x 6.9 mm).

26.0	8.0	11.0	Holotype of <i>aglaia</i>
23.5	6.9	9.4	Cove Rock, East London, South Africa

Synonymy—

1925 *Columbella agulhasensis* Thiele, Wissen. Ergeb. Deut. Tiefsee-Exp. "Valdivia", vol. 17, p. 139, pl. 18, fig. 20 (Agulhas Bank, Sth. Africa, 155 m).

1932 *Charitodoron aglaia* Tomlin, Annals Sth. African Museum, vol. 30, pt. 2, p. 169 textfig. 9 (no locality given).

1959 *Charitodoron agulhasensis* (Thiele), Barnard, Annals Sth. African Museum, vol. 45, p. 146; 1970 Chernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 40.

Types—The holotype of *C. agulhasensis* (Thiele) is in the Zoological Museum, Humboldt University, Berlin, no. ZMB Moll. 101678. The holotype and 1 paratype of *C. aglaia* Tomlin, is in the South African Museum, Cape Town, no. A-3440. The type locality of *C. agulhasensis* is Agulhas Bank, Sth. Africa, Lat. 35°16'S and Long. 22°26.7'E, in 155 m.

Records—SOUTH AFRICA: Cove Rock, East London, 80-130 faths. (BMNH); Agulhas Bank, 155 m (ZMB); Cape St. Blaize, 125 faths.; 36°40'S and 21°26'E, 200 faths. (both Barnard, 1959).

Charitodoron thalia Tomlin, 1932

(Pl. 465; pl. 466)

Range—South Africa.

Remarks—The variability in axial sculpture in *C. thalia* was responsible for three different descriptions of the species. In the immature holotype of *C. thalia*, the axial riblets disappear on the last 2½ whorls, in the holotype of *C. pasithea* Tomlin, the axials become obsolete on the last whorl, while in the juvenile holotype of *C. bathybius* (Barnard), the axials persist to the body whorl. Barnard (1960) pointed out that the variability of spiral sculpture suggested the possibility that *C. pasithea* may be only a form of *C. thalia*, but at the same time overlooked the equally variable axial sculpture of the species.

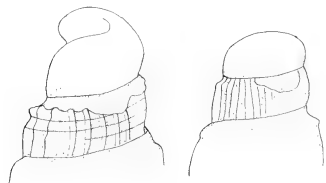


Plate 465. *Charitodoron thalia* Tomlin. Two views of the protoconch.

Habitat—From 131 to 900 fathoms.

Description—Shell up to 35 mm (about 1½ inches) in length, elongate-ovate, thin and fragile, sutures distinct, occasionally narrowly channeled. Whorls 4½-7, apart from a protoconch of 1½-2½ large and mamillate nuclear whorls, spire

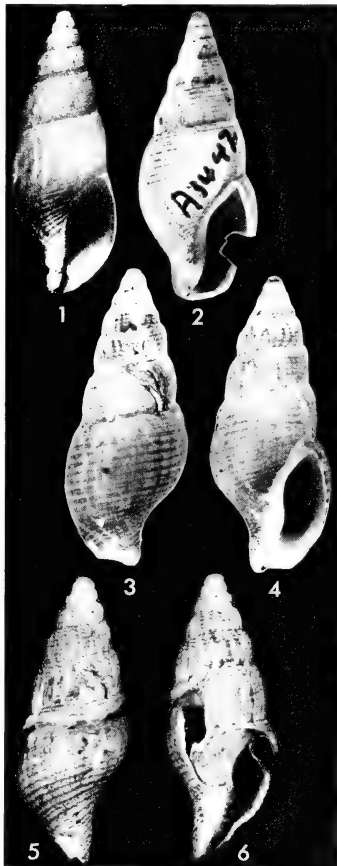


Plate 466. *Charitodoron thalia* Tomlin.

Fig. 1. Holotype from off Cape Point, Sth. Africa, 131 fms. (from Tomlin, 1932, textfig. 10; 21.0 x 8.0 mm).

Fig. 2. Specimen from Buffalo Rocks, Sth. Africa (BM (NH) A-3447; 14.9 x 6.1 mm).

Figs. 3, 4. Lectotype of *Charitodoron pasithea* Tomlin from off Cape Point, Sth. Africa, 430-630 fms. (BM (NH); 21.0 x 8.2 mm).

Figs. 5, 6. Holotype of *Mitra (Dibaphus) bathybius* Barnard from off Cape Natal, Sth. Africa, 440 fms.; juvenile specimen (SAM A-8827; 13.6 x 7.2 mm).

whorls convex and occasionally subangulate at the sutures. The sculpture consists of impressed, shallow or deep spiral grooves which give rise to narrow, flat or slightly elevated spiral cords which persist to the body whorl. The axial riblets are slender, irregular and slightly arcuate and either become obsolete on the last $2\frac{1}{2}$ whorls or persist to the body whorl. The aperture is equal in height or shorter than the spire, narrow and smooth within, the outer lip is regularly convex, thin and simple; the columella is calloused in adult specimens, recurved and plaitless. The siphonal canal is short and recurved to the left and the siphonal notch is shallow. Cream in colour under a yellowish periostracum, aperture white.

Measurements (mm)—

length	width	height of aperture	
34.5	13.5	15.0	Cape Point, South Africa
21.0	8.0	9.0	Holotype of <i>thalia</i>
21.0	8.2	9.2	Lectotype of <i>pasithea</i>
14.9	6.1	7.2	Buffalo Rock, South Africa
13.6	—	7.2	Holotype of <i>bathybius</i>

Synonymy—

- 1932 *Charitodoron thalia* Tomlin, Annals Sth. African Museum, vol. 30, pt. 2, p. 167, textfig. 10 (off Cape Point, Sth. Africa, 131 fms.); 1959 Barnard, Annals Sth. African Museum, vol. 45, p. 147; 1960, Journal of Conchology, vol. 24, no. 11, p. 402; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 40.

- 1935 *Charitodoron pasithea* Tomlin, Journal of Conchology, vol. 22, no. 3, p. 50, textfig. (off Cape Point, Sth. Africa, 430-630 fms.); 1959 Barnard, Annals Sth. African Museum, vol. 45, p. 146; 1960, Journal of Conchology, vol. 24, no. 11, p. 402; 1970 Cernohorsky, Bull. Auckland Inst. Museum, no. 8, p. 40.

- 1959 *Mitra (Dibaphus) bathybius* Barnard, Annals Sth. African Museum, vol. 45, p. 51, fig. 13b (shell), fig. 11c (radula) (off Cape Natal, Sth. Africa, 440 fms.) [juvenile specimen]; 1960, Journal of Conchology, vol. 24, no. 11, p. 402.

Types—The holotype of *C. thalia* Tomlin, no. A-1742, and the holotype of *C. bathybius* (Barnard), no. A-8827, are in the South African Museum, Cape Town. The type-specimen of *C. pasithea* which was illustrated by Tomlin and which has a repair scar above the outer lip and which was said to be in the South African Museum, no. A-3434, is now in the British Museum (NH). Tomlin stated that several examples were dredged, and since no holotype has been selected by Tomlin in the original publication nor was the specimen marked as such, the existing specimen in the British Museum (NH) is here designated as the lectotype of *C. pasithea* Tomlin. The type locality of *C. thalia* is off Cape Point, Sth. Africa, in 131 fathoms.

Records—SOUTH AFRICA: off Cape Point, 131 faths. (SAM); off Cape Point, 430-630 faths. (BMNH); off Cape Point, 800-900 faths.; off Buffalo River, East London area, 310 faths. (both Barnard, 1959); Buffalo Rocks (BMNH); off Cape Natal, 440 faths. (SAM).

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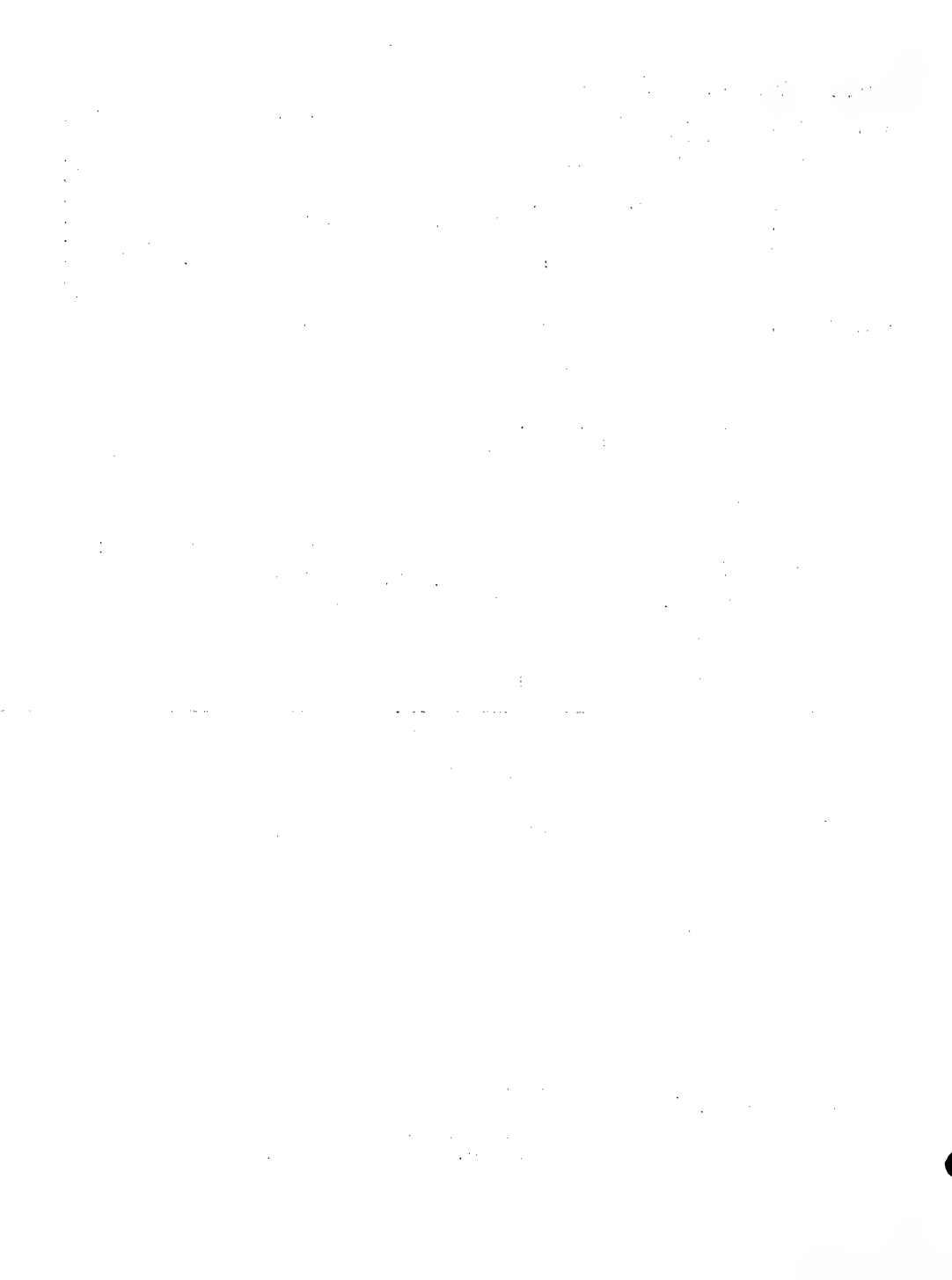
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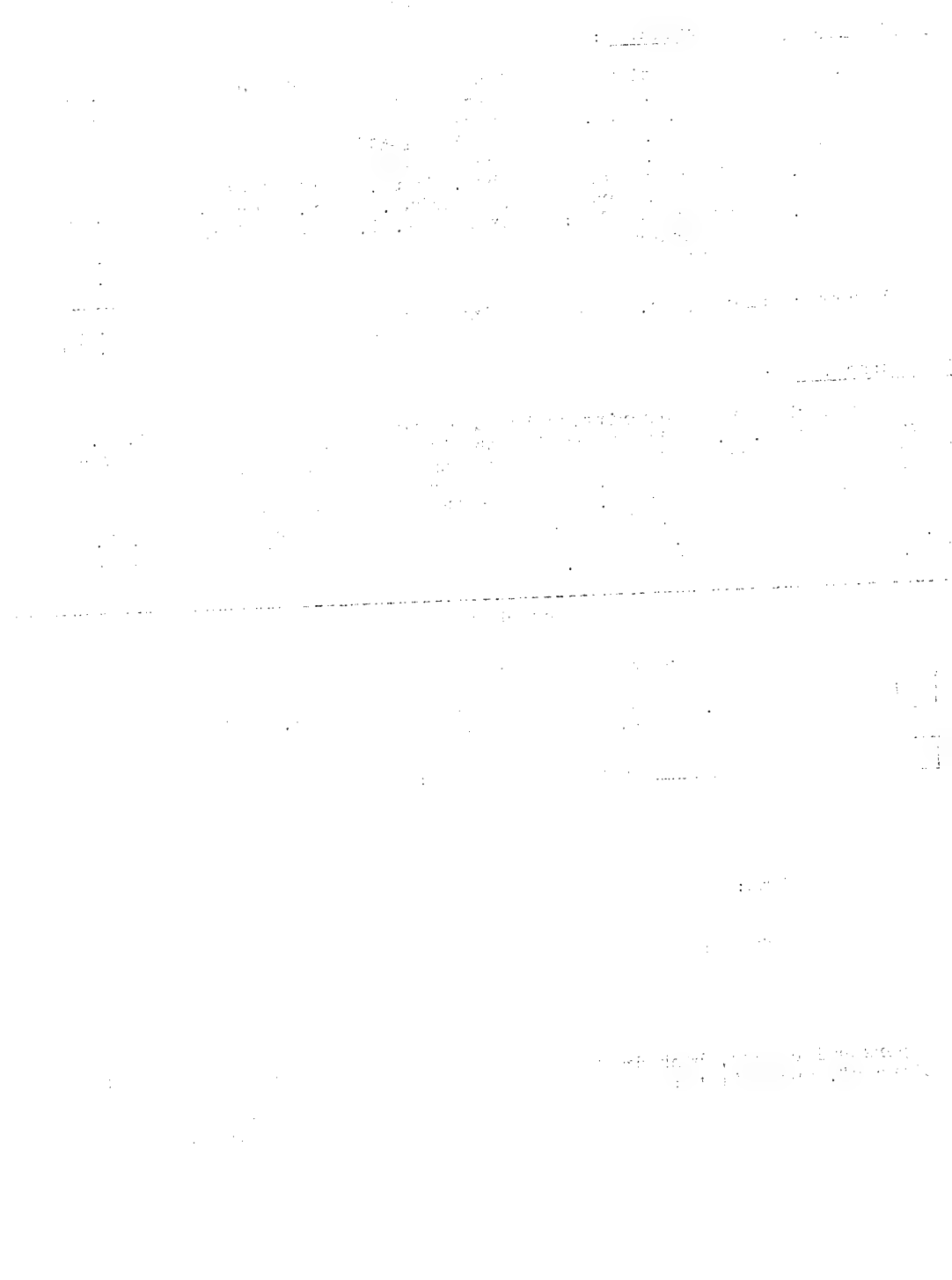
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3. The third part of the report is a detailed description of the results of the study. It discusses the findings of the study and the conclusions drawn from the results. It also provides a brief overview of the limitations of the study.

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5. The fifth part of the report is a detailed description of the conclusions drawn from the study. It discusses the implications of the study and the recommendations for future research.

6. The sixth part of the report is a detailed description of the conclusions drawn from the study. It discusses the implications of the study and the recommendations for future research.

7. The seventh part of the report is a detailed description of the conclusions drawn from the study. It discusses the implications of the study and the recommendations for future research.

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• *Chlorophyll a* (Chl a) is the primary photosynthetic pigment in most plants and algae. It is a green pigment that absorbs light energy in the blue and red regions of the visible spectrum. Chl a is essential for the light-dependent reactions of photosynthesis, where it converts light energy into chemical energy in the form of ATP and NADPH.

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1. Introduction

The purpose of this study is to investigate the effects of various factors on the performance of a system. The study is organized as follows: Section 2 describes the system and the factors being investigated. Section 3 presents the experimental design and the results of the experiments. Section 4 discusses the implications of the results and the conclusions of the study.

2. System Description

The system under investigation is a complex system with many components. The factors being investigated are the input variables, the output variables, and the system parameters. The system is described in detail in the following sections.

3. Experimental Design

3.1. Design of Experiments

The experimental design is based on the principles of factorial design. The factors being investigated are the input variables, the output variables, and the system parameters. The results of the experiments are presented in the following sections.

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